

USER MANUAL

FlarmBat

Portable PowerFlarm device

Rev.12



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1 Important Notices and safety information

Read all safety information before using the device to ensure safe and proper use.

The LXNAV system is designed for VFR use only as an aid to prudent navigation. All information is presented for reference only. Terrain, airports and airspace data are provided only as an aid to situation awareness.

Information in this document is subject to change without notice. LXNAV reserves the right to change or improve their products and to make changes in the content of this material without obligation to notify any person or organization of such changes or improvements.



A Yellow triangle shows parts of the manual which should be read very carefully and are important for operating the system.



Notes with a red triangle describe procedures which are critical and may result in loss of data or any other critical situation.



A bulb icon shows when a useful hint is provided to the reader.

1.1 Limited Warranty

This LXNAV product is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, LXNAV will, at its sole discretion, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alterations or repairs. LXNAV Instrument displays damaged by direct or magnified sunlight are not covered under warranty.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL LXNAV BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. LXNAV retains the exclusive right to repair or replace the unit or software, or to offer a full refund of the purchase price, at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local LXNAV dealer or contact LXNAV directly.

1.2 Battery

A rechargeable battery power the FlarmBat. The battery can be charged and discharged hundreds of times, but it will eventually wear out. Only use the approved battery and recharge your battery only with approved chargers.

When not in use, unplug the charger from the electrical plug and the device. Do not leave a fully charged battery connected to a charger, as overcharging may shorten its life. If left unused, a fully charged battery will lose its charge over time. Use the battery only for its intended purpose. Never use a charger or a battery that is damaged.

If the battery pack is mishandled, the battery pack can burst, cause a fire or even chemical burns. Observe the following precautions.

- Do not disassemble.
- Do not crush and do not expose the battery pack to any shock or force such as hammering, dropping, or stepping on it.
- Do not short circuit and do not allow metal objects to come into contact with the battery terminals.
- Do not expose to high temperature above 60°C (140°F) such as in direct sunlight or in a glider parked in the sun.
- Do not incinerate.
- Do not handle damaged or leaking lithium ion batteries.
- Be sure to charge the battery pack using the supplied battery charger or a device that can charge the battery pack.
- Keep the battery pack out of the reach of (small) young children.
- Keep the battery pack dry.
- Replace the battery pack only with the same or equivalent type recommended by LXNAV.
- Dispose of used battery packs promptly as described in these instructions.



1.3 Disposal of Old Electrical & Electronic Equipment

(Applicable in the European Union and other European countries with separate collection systems)



This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will be a help to conserve natural resources. For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service, or the shop where you purchased the product.

1.3.1 Disposal of waste batteries

(Applicable in the European Union and other European countries with separate collection systems)



This symbol on the battery or on the packaging, indicates that the battery provided with this product shall not be treated as household waste. By ensuring these batteries are disposed of correctly, you will help prevent potentially negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of the battery. The recycling of the materials will help to conserve natural resources. In case of products that for safety, performance or data integrity reasons, require a permanent connection with an incorporated battery, this battery should be replaced by a qualified service staff only. To ensure that the battery will be treated properly, hand over the product at end-of-life to the applicable collection point for the recycling of electrical and electronic equipment. For all other batteries, please view the section on how to remove the battery from the product safely. Hand the battery over to the applicable collection point for the recycling of waste batteries. For more detailed information about recycling of this product or battery, please contact your local Civic Office, your household waste disposal service or the shop where you purchased the product.

(Applicable for Customers in the U.S.A. and Canada)



Lithium-Ion batteries are recyclable. You can help preserve our environment by returning your used rechargeable batteries to the collection and recycling location nearest you. For more information regarding recycling of rechargeable batteries, call toll free 1-800-822-8837, or visit <http://www.rbc.org/>



Do not handle damaged or leaking Lithium-Ion batteries.

1.4 Declaration of Conformity



1.4.1 FCC

1.4.1.1 LXNAV AM module

Product:	Flarm receiver with GPS
Type reference:	FlarmBat
Manufacturer:	LXNAV d.o.o., Kidričeva 24, 3000 Celje, Slovenia
Trademark:	LXNAV
FCC ID:	2ASPHLXNAVAM
Operating frequencies:	902.4MHz-927.8MHz
Ratings:	8-36VDC
	Protection class: III
Testing Method:	47 CFR Part 15, Subpart B (Clause 15.107 and 15.109)

This device complies with Part 15 of the FCC.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

The following test reports are subject to this declaration:

Test report number: T251-0588/19 Issue date:8.8.2019

Within the USA, the device may only be used in transportation vehicles such as aircraft or motor vehicles.

The following importer is responsible for this declaration:

Company name: _____
Company address: _____
Telephone: _____

1.4.1.2 WiFi module

Product: WiFi module
Type reference: FlarmBat
Manufacturer: ESPRESSIF SYSTEMS (SHANGHAI)
CO., LTD
Trademark: ESPRESSIF SYSTEMS
FCC ID: 2AC7Z-ESPS3WROOM1
Operating frequencies: 2402.0MHz-2480.0MHz 2412.0MHz-2462.0MHz

This device complies with Part 15 of the FCC.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

The following test reports are subject to this declaration:

The following importer is responsible for this declaration:

Company name: _____
Company address: _____
Telephone: _____

1.4.2 CE

Declaration of conformity

Hereby, LXNAV d.o.o. declares under its sole responsibility that the following product is compliant with the essential requirements and other relevant provisions of the Radio Equipment Directive (RED) 2014/53/EU

Identification of product

FlarmBAT and FlarmBAT+
Type: IGC and Non IGC

Manufacturer

LXNAV d.o.o.
Kidričeva ulica 24,3000 Celje, Slovenija

Related standards

RED directive 2014/53/EU

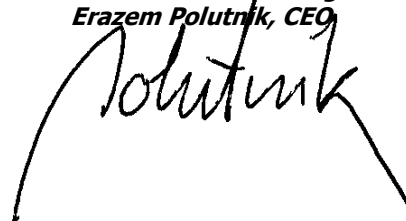
Remark

The product is designed to comply with LXNAV standards and standards harmonised with directive 2014/53/EU:

Safety	EN 62368-1:2014+A11:2017 EN 62368-1:2014
Health	EN 62479:2010 EN 50665:2017
EMC	EN 301 489-1 V2.1.1 EN 301 489-19 V2.1.1 (2019-4) EN 301 489-1 V2.2.3 (2019-11) EN 301 489-3 V2.3.2 (2023-01) EN 301 489-17 V3.1.1 EN 301 489-17 V3.2.4
Radio	EN 300 328 V2.2.2 EN 303 413 V1.2.1 (2021-4) EN 300 220-1 V3.1.1 (2017-02) EN 300 220-2 V3.2.1 (2018-06)

Celje, 20.03.2023

Authorized signature
Erazem Polutnik, CEO



1 Revision History

Date	Revision	Revised by	Description
October 2018	1		Initial release of this manual
November 2018	2		Corrected some misprints
February 2019	3		Updated chapter: 4.10.2 Removed chapter: 4.10.3 Added chapter: 4.8.2
March 2020	4		Added Chapters 4.6,7.1,7.2,8.1.2,8.3
July 2020	5		Added chapter 4.7
September 2021	6		Updated chapters 8.1, 8.1.1
January 2021	7		Style update
November 2022	8	UK	Added chapters 1.2,0, 3.1.4,3.1.5
March 2023	11	UK	Updated chapters 1.4.2
April 2024	12	UK	Added chapters and description for FlarmBat+

2 Packing Lists

FlarmBat

- FlarmBat
- Flarm antenna (1)
- 2nd Flarm antenna - optional
- Power cable
- ADS-B antenna – optional
- Micro SD card with manual

FlarmBat+

- FlarmBat+
- Flarm antenna (1)
- 2nd Flarm antenna - optional
- Power cable
- ADS-B antenna – optional
- Micro SD card with manual
- IO cable (Button and Audio output)

2.1 Part numbers

<u>Model</u>	<u>Part number</u>	<u>Description</u>
FlarmBat	<u>FlarmBat</u>	Portable FlarmBat+ device RFB (second receiver), ADS-B, Igc option, ENL option, built-in gps antenna, built-in Bluetooth module, SD card, internal battery, 3x short 90° dipole antennas
FlarmBat+	<u>FlarmBat+</u>	Portable FlarmBat+ device RFB (second receiver), ADS-B, Igc option, ENL option, built-in gps antenna, built-in Wifi and Bluetooth module, SD card, internal battery, 3x short 90° dipole antennas
FlarmBat+GA	<u>FlarmBat+GA</u>	Portable FlarmBat+ device RFB (second receiver), ADS-B, built-in gps antenna, built-in Wifi and Bluetooth module, SD card, internal battery, 3x short 90° dipole antennas

3 Basics

3.1 LXNAV FlarmBat display at a Glance

An ideal club compact portable standalone device based on PowerFLARM technology. It comes with an integrated LED indicator, a built-in Bluetooth module which works with Android and iOS, internal battery up to 10h, GPS module and an option of an IGC flight recorder with internal pressure sensor.

It's a collision avoidance device, designed for gliders as well as for other participants in the air. FLARM® is in widespread use and features include:

- Display of nearby Flarm traffic with warning visually and acoustically of approaching other aircraft or fixed obstacles (where database has been installed)
- intelligent motion prediction which minimizes nuisance alarms and supports situational awareness
- integration with over 50 compatible products by other manufacturers (e.g. PDA moving maps) through open serial port protocol
- SD Card for easy uploads and downloads, IGC-format flight recording and OLC-approval
- based on award-winning original FLARM® design, endorsed by FAI, IGC/OSTIV and EASA (AMC Part 21, Part M)
- optional diamond-level IGC-approval with/without engine noise sensor (ENL)
- a typical radio range that can be verified with online radio range analyser
- powerful 72-channel high-precision uBlox NEO8-GPS module
- full compatibility with wide range of Flarm-licensed products
- operation on a license-free radio band, not based on transponder technology
- small size and simple installation

FlarmBat is available in 5 variants:

1. FlarmBat with Flight recorder (Not approved by IGC), with enabled SAR (search and rescue) function
2. FlarmBat with IGC approved Flight recorder (Up to Diamonds) and SAR function
3. FlarmBat with IGC approved Flight recorder (Up to Diamonds), Engine noise sensor and SAR function
4. RFB – second Flarm antenna (dual antenna diversity) -available for all versions (Non IGC, IGC and IGC ENL)
5. ADS-B module as an option

FlarmBat+ is available only in a full configuration, IGC and ENL options are optionally



Not approved FlarmBat will arrive with non-valid IGC number. When purchasing IGC approved Flight recorder option you will receive instructions from LXNAV on how to make your FlarmBat IGC approved. New IGC number will be allocated after the procedure is done.

3.1.1 FlarmBat comparison table

Options	FlarmBat	FlarmBat+	FlarmBat + GA
RFB	Yes	Yes	Yes
Micro SD card	Yes	Yes	Yes
Bluetooth	Yes (not for the US market)	Yes	Yes
Wi-Fi		Yes	Yes
TCPIP		Yes	Yes
Configurable Audio output		Yes	Yes
External configurable push button		Yes	Yes
IGC option	Optional	Yes	No
ENL option	Optional	Yes	No
FCC approval	Yes (PowerMouse FCC version)	Yes (FCC version)	Yes (FCC version)

3.1.2 LXNAV FlarmBat features

- extremely bright bicolor LEDs
- pushbutton on LED indicator, to adjust some settings
- NEAR mode function
- adjustable baud rate on each comm. port
- adjustable brightness of the screen
- Low current consumption
- Distance indicator
- Built in battery for 12 hours of independent working (including 2nd flarm receiver and ADSB receiver). *Without ADSB and 2nd flarm receiver, may take longer.*
- Wi-Fi integrated (only at FlarmBat+)

3.1.3 Interfaces

PowerMouse

- Two Standard Flarm/IGC port on RJ45 with serial RS232 interface
- pushbutton
- Micro SD card
- Bluetooth (Not available in US version)
- 2xSMA for Flarm antenna (US version has reverse polarity SMA)
- 1xSMA for ADSB antenna
- 12 bicolor LEDs for direction
- 5 LEDs for vertical angle
- 3 LEDs for GPS, Rx and Tx indication

- 3 LEDs for battery and charger status
- LED distance indicator

PowerMouse+

- Two Standard Flarm/IGC port on RJ45 with serial RS232 interface
- pushbutton
- USB Port (up to 2.0)
- Wi-Fi/Bluetooth
- 2xSMA for Flarm antenna (US version has reverse polarity SMA)
- 1xSMA for ADSB antenna
- 12 bicolor LEDs for direction
- 5 LEDs for vertical angle
- 3 LEDs for GPS, Rx and Tx indication
- 3 LEDs for battery and charger status
- LED distance indicator
- Audio output
- Digital input



Default baud rate of PowerMouse is set to 19200bps. In case, that you have any problems with Flarm indicator (FlarmView), please check baud rate setting on it.

3.1.4 Flarm antenna color coding

Red marked antenna is for Europe (868.2Mhz)

Blue marked antenna is for USA, CANADA, Australia (915MHz)

Green marked antenna is for USA with reverse polarity SMA (915MHz) – FCC approved

3.1.5 Options

One or more external Flarm Displays can be connected (FlarmView/FlarmLED)

3.1.6 Technical Data

FlarmBat

- Power input: 8-36V DC
- Consumption: 62mA@12V (750mW) – when battery is full
- Consumption: 500mA@12V (6W) – when battery is empty
- Weight: 240g
- Dimensions: 105mm x 80mm x 35mm
- Operating temperature: -30°C to +60°C (-22°F to +140°F)
- Storage temperature: -40°C to +80°C (-40°F to +176°F)
- PowerFlarm module
- Bluetooth module

FlarmBat+

- Power input: 8-36V DC
- Consumption: 162mA@12V (1.9W) – when battery is full
- Consumption: 500mA@12V (6W) – when battery is empty
- Weight: 240g
- Dimensions: 105mm x 80mm x 35mm
- PowerFlarm module

- Wifi and BLE module

PowerFlarm module

- Frequency: SRD860 band (\approx 868 MHz - EU) or an ISM band (\approx 915 MHz - NA) in different parts of the world
- Receive Sensitivity: -110 dBm
- Maximum radiated transmission power: (EU)14dBm (NA):17dBm
- Flarm antenna gain 3dBi

Bluetooth module

- Frequency: 2.402 to 2.480 GHz
- Receive Sensitivity: -90 dBm (Classic); -92 dBm (LE)
- Power Output: 2 dBm (typ.)

Wifi and BLE (at FlarmBat+)

- Wi-Fi and BT4LE band 2.4GHz
- Wi-Fi antenna gain 6dBi, FCC version has integrated Wi-Fi antenna

3.1.6.1 Environmental limitations

- Operating temperature: -30°C to +60°C (-22°F to +140°F)
- Storage temperature: -40°C to +80°C (-40°F to +176°F)
- Relative humidity: 0%-95%
- Vibration: +/- 50m/s² at 500Hz

3.2 Hardware variants

FlarmBat and FlarmBat+ can be configured in many variants:

- With primary PowerFlarm module (standard)
- With secondary PowerFlarm module (2 antennas, optional)
- With ADS-B receiver (optional)

3.2.1 PowerFlarm module

All FlarmBats have as a standard built in one PowerFlarm receiver, which can receive data from other PowerFlarm/Flarm equipped aircrafts.

3.2.2 Secondary PowerFlarm module

Is optional and is designed for second antenna, to be installed in the bottom of the aircraft. With second antenna, user gets much wider angle of view, not just horizontally, but also vertically.



2nd PowerFlarm module can be retrofitted into FlarmBats.

3.2.3 ADS-B module

FlarmBat device has a possibility to have an internal ADS-B module. ADS-B module is not a standard part of the FlarmBat, therefore when ordering you have to order FlarmBat with ADSB.

With ADS-B you will see all traffic equipped with mode S transponders.



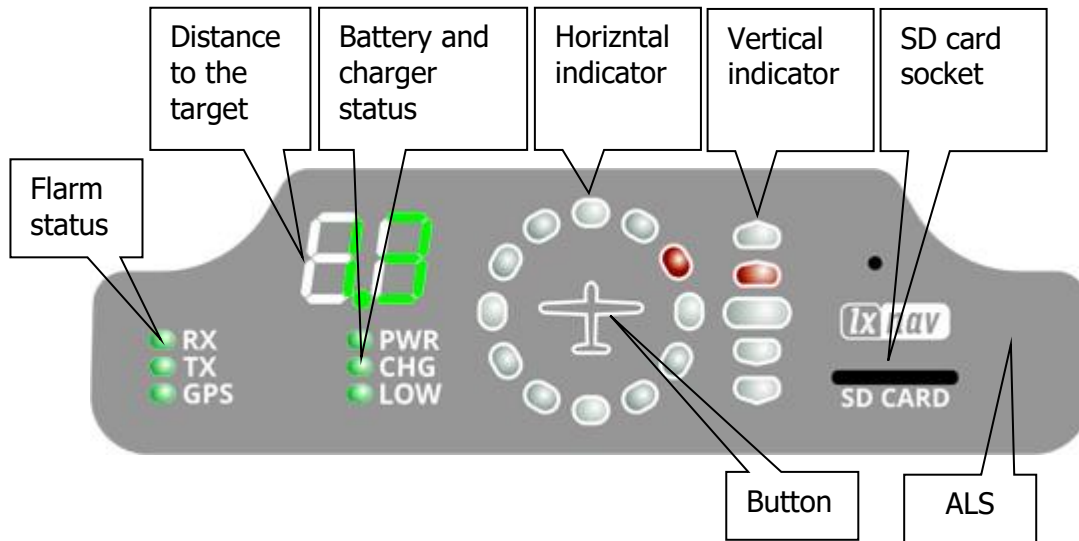
ADS-B module can be retrofitted into FlarmBats.

4 System Description

4.1 Description of Flarm (PowerFlarm) Led Display

It consists of 5 main parts:

- Status LEDs
- Horizontal direction LEDs
- Vertical direction LEDs
- Push button
- Beeper
- ALS (Ambient light sensor)



4.1.1 Status LEDs

Status LEDs indicates if PowerFlarm receiver receives any data, transmits data and GPS status.

RX status led indicates that PowerFlarm is receiving something from other Flarm units.

TX status led indicates that Flarm is transmitting data.

GPS status led has 3 different modes:

- Fast blinking mode, means, that LED display does not receive anything over serial bus (probably needs to set correct baud rate with flarm config.txt)
- Slow blinking means, that GPS status is BAD
- Solid light means, that GPS status is OK.

4.1.2 Battery and charger status LEDs

All LED's are in green color.

- **PWR** LED is ON, when unit is powered on.
- **CHG** LED is on, when internal battery is charging
- **LOW** LED is on, when internal battery voltage is low

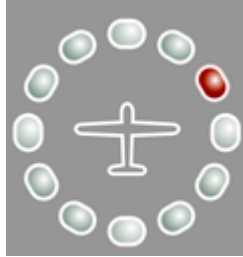


Internal battery is charging only, when FlarmBat is powered on and connected to external power.

4.1.3 Horizontal direction LEDs

They are in yellow or red color.

12 horizontal LEDs are indicating the direction of threat.
Example shows threat from front right side (2'o clock)



4.1.4 Vertical direction LEDs

They are in yellow color.

LEDs are describing vertical angle of threat divided by 14°

Example shows that threat is approximately 14° above us, top led threat will be 28° or higher above us.



Resolution of vertical indicator can be set in the setup

4.1.5 Distance to the target indicator

It is in green color. In normal operation, it shows distance to the target in units, selected in setup menu.



4.1.6 SD card socket

SD card can be used for PowerFlarm configuration and for storing flights. If SD card is empty, all flights stored will be copied to SD card after power on.

4.1.7 Push Button

With push button we can adjust volume of beep, turning on/off near mode or adjust initial settings of the display. Initial settings can be configured in setup.

4.1.8 ALS

Is Ambient light sensor. If Brightness is set to automatic, it will be adjusted depending on ambient light sensor. More sun light will be, brighter will be LEDs.

4.2 Powering up FlarmBat

LXNAV FlarmBat Powers ON after pressing the button. First it passes boot up sequence with test of all LEDs and short beep, shows version of FlarmBat display firmware (yellow horizontal

led indicates major version, distance indicator shows minor version). After few seconds of startup screens, unit will enter in normal operation mode.

4.3 Startup sequence

Press and hold button for two seconds.

PWR LED will indicate powering up. If FlarmBat did not power up, you need to hold button longer or internal battery is empty, or external power supply is not present.

4.4 Shutting down FlarmBat

With extremely long press to the button, FlarmBat will shut down.

4.5 Normal operation

In normal operation with short press, we can cycle between three different volumes (Low, Medium and High). With long press, is enabled or disabled near mode. Switching of mode is also visually supported with moving light around circle. Red moving light means that near mode is disabled, yellow moving light means that near mode is enabled.

4.5.1 WARNING Modes:

WARNING Mode will activate a red blinking diode, if another glider equipped with Flarm will be close and a prediction for a **collision** risk is calculated. An audio warning will be also executed. Higher collision risk will increase blinking frequency and audio beep rate. The warnings are classified into three levels (See Flarm manual for details on www.flarm.com)

- First level approximately **18 seconds** before predicted collision
- Second level approximately **13 seconds** before predicted collision
- Third level approximately **8 seconds** before predicted collision

4.5.2 NEAREST Mode:

Will show the direction to the nearest glider, which's position is inside of radio range. **One** yellow LED will light **permanently** and there will be **no audio**. The unit will change over to Warning Mode **automatically, if warning** criteria will be fulfilled and will continue in NEAREST after collision risk will disappear.



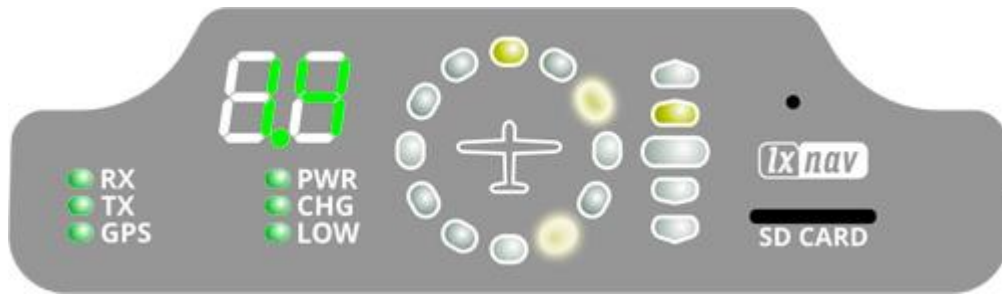
Near mode works only when you are moving. On ground, you cannot see nearest target.



Near mode can be enabled or disabled with longer press to the button, during normal operation. Yellow "flying LED" around horizontal led indicator will indicate Near mode ON, Red "flying LED" around horizontal led indicator will indicate Near mode OFF.

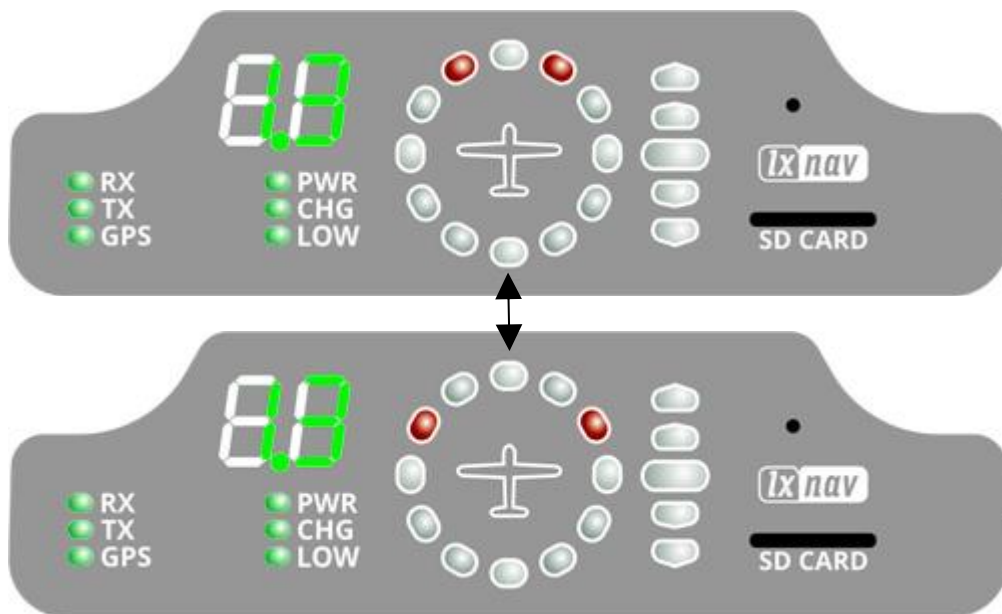
4.5.2.1 Multi target in nearest modus

If more than one targets are in the neighbourhood, the closest target will be displayed with yellow LED permanently. All other targets will blink in yellow color. Distance and vertical angle will indicate the closest target.



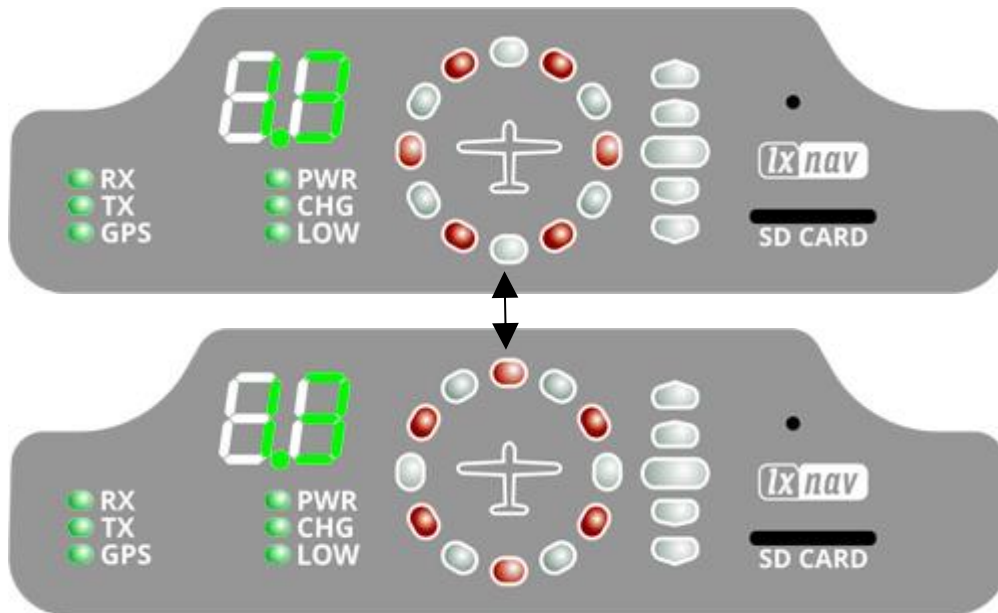
4.5.3 Obstacle warning

An obstacle warning will be activated, if an obstacle is to be found in the front of the glider and a collision risk is predicted. The warning is shown with two red LEDs, symmetrical around the 12 o'clock LED at 10 and 2, they alternate with those at 11 and 1. As we approach to the obstacle the frequency of the alternation increases.



4.5.4 Undirected PCAS warning

If the FlarmLED is connected to a device, which also translates transponder signals with ADS-B data into Flarm warnings, you will receive them in the same logic as other flarm objects. Transponder signals without ADS-B data contain no direction for the thread therefore you will get an undirected warning with the following alternating signals:



4.6 Bluetooth

To connect to the FlarmBat via Bluetooth, you must search on a PDA/Smartphone for Bluetooth enabled devices in range. Click PAIR or CONNECT to connect to the FlarmBat. Device will appear as LXNAV-FPM-(5-digit serial). Device doesn't require any pairing password.

Bluetooth is always ON and cannot be configured. Purpose of Bluetooth is to send Flarm objects to the other Bluetooth device. When device is on Bluetooth LED will flash blue every 3 seconds, when device is successfully connected in will flash twice every second.

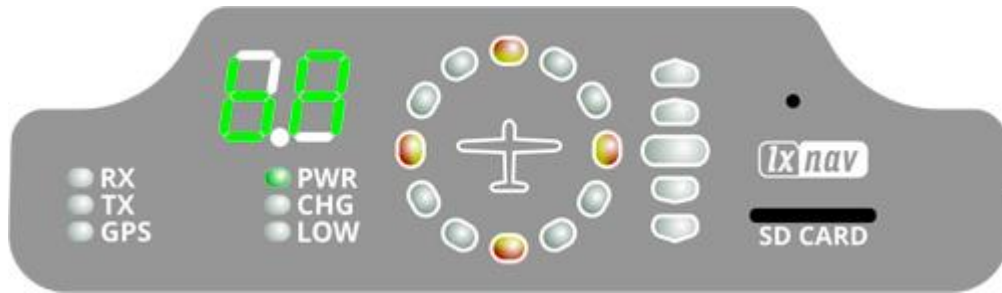
4.7 Charging internal battery

Internal battery is charged immediately, when external power supply is present. When battery is full, charging is stopped automatically. LXNAV provides special wall charger to charge FlarmBat. The battery will charged only if the FlarmBat is powered on.

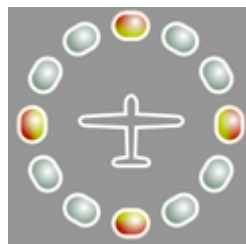
5 Setting up FlarmBat

If we hold the push button, during power on, LED display will go into setup mode, where following settings can be adjusted:

- Brightness of LED's
- Volume on beeper
- Near mode
- PCAS setting
- ADSB setting
- Units setting



Setup mode is indicated with following horizontal indicator image:



With long press to the button we are switching between different settings, which can be set. Short press will change value for actual setting.

First (left digit) indicates the setting, that we are setting, second digit (right) shows the value of that setting.

On picture below, left digit indicates character "b", right indicates character "A".



Setting	Left digit description	Right digit description
Brightness of LED's	b	A.. automatic (ALS) (default) 0.. Minimum brightness 1.. Medium - 2.. Medium + 3.. Maximum brightness
Units setting	U	0.. km (default) 1.. nm

		2.. ml
Vertical indicator LED resolution	I	0.. 3° and 7° 1.. 7° and 14° 2.. 14° and 28° (default)
Decimal point	d	0.. automatic (0.0 to 99) 1.. fixed decimal point (0.0 to 9.9)
Near mode	n	0.. OFF (default) 1.. ON one target 2.. ON 2 targets 3.. ON 3 targets 4.. ON 4 targets 5.. ON 5 targets .. 9.. ON 9 targets
PCAS ⁽¹⁾	P	0.. PCAS OFF 1.. PCAS ON
ADSB display ⁽¹⁾	A	0.. OFF (default) 1.. ON
Volume on beeper	S	0.. Minimum volume 1.. Medium 2.. maximum (default)

¹⁾ Available only if ADSB is built in

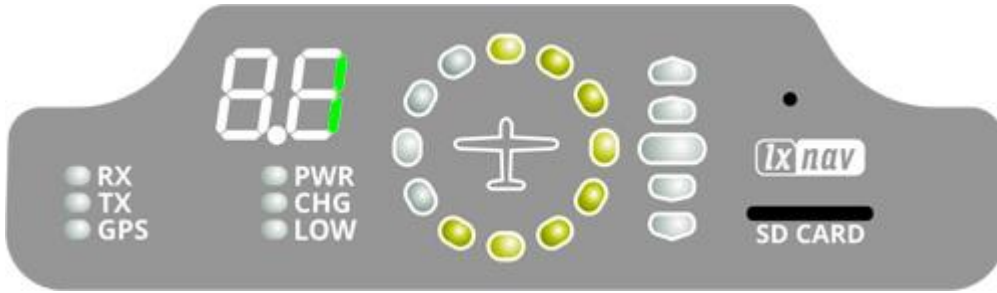
ADSB display of target will be available only if NEAR mode is ON, ADS-B is ON, and no closer flarm traffic available. PCAS information will be available if ADS-B is set to 2, no flarm warnings present and no closer traffic, which might be sometimes very annoying.

6 Other indications

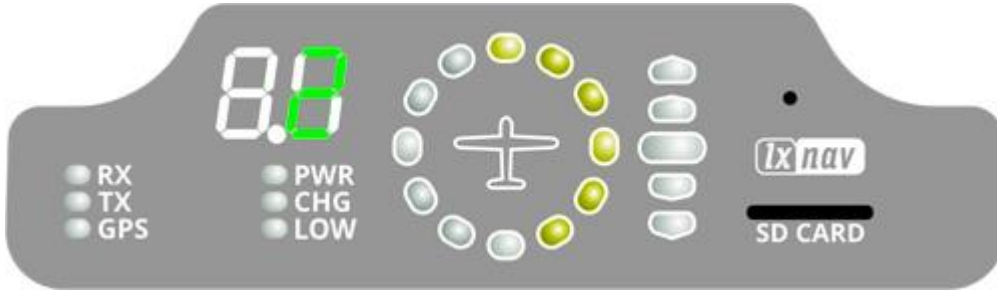
The FlarmBat Display can indicate some further statuses.

Left digit indicates type of the operation. Horizontal indicator indicates progress.

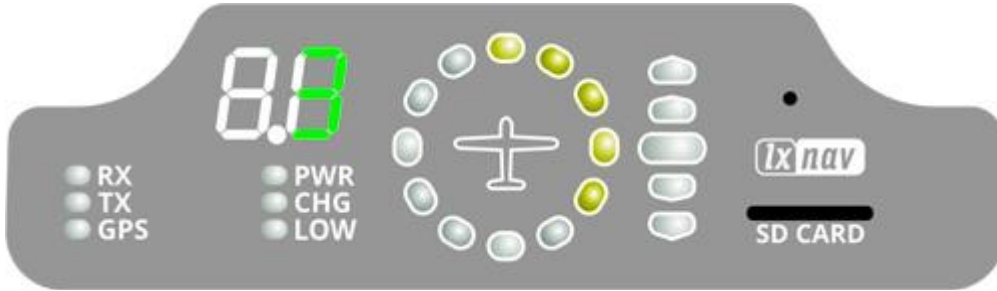
6.1.1 IGC-file download onto SD-card (1)



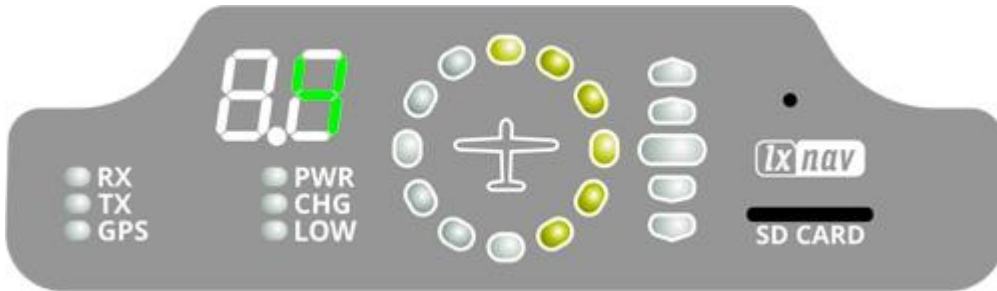
6.1.2 Running Flarm firmware update from SD-card (2)



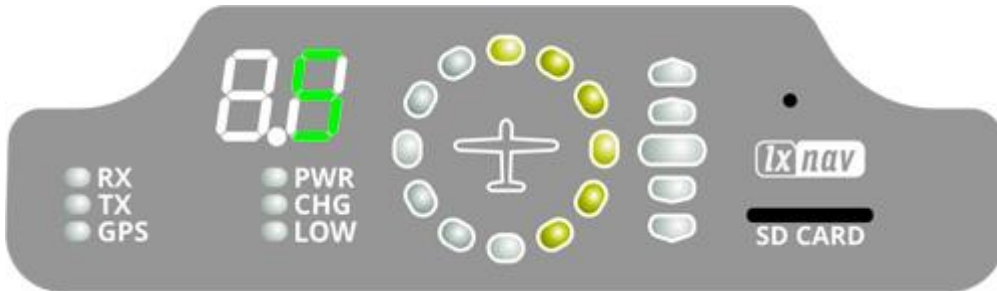
6.1.3 Obstacle database update from SD-card (3)



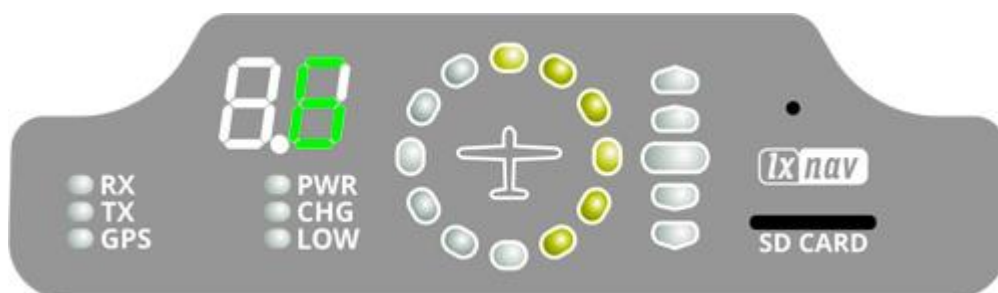
6.1.4 Diagnostic dump (4)



6.1.5 Restore file system (5)

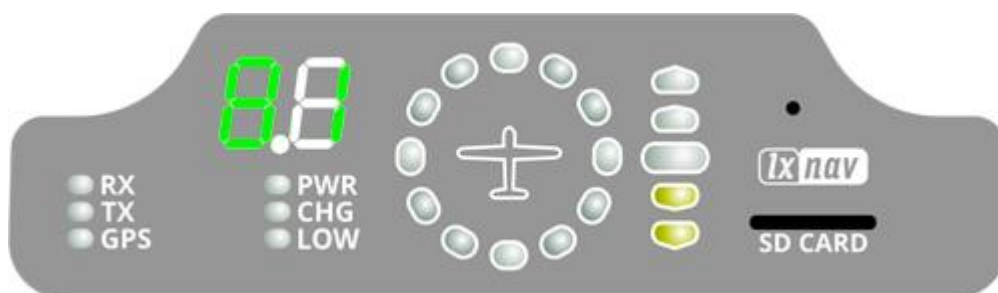


6.1.6 Internal consistency check (6)



6.1.7 Error codes from flarm

If any error is present numeric display will blink with an error code.



On picture below is code 81, which means No Obstacles.



Error codes are described in the list below.

11 = Firmware expired (requires valid GPS information, i.e. will not be available in the first minute or so after power-on)

12 = Firmware update error

21 = Power (e.g. voltage < 8V)

22 = UI error

23 = Audio error

24 = ADC error

25 = SD card error

26 = USB error

27 = LED error

28 = EEPROM error

29 = General hardware error

2A = Transponder receiver Mode-C/S/ADS-B unserviceable

2B = EEPROM error

2C = GPIO error

31 = GPS communication

32 = Configuration of GPS module





33 = GPS antenna

41 = RF communication

42 = Another FLARM device with the same Radio ID is being received. Alarms are suppressed for the applicable device.

- 43 = Wrong ICAO 24-bit address or radio ID
- 51 = Communication
- 61 = Flash memory
- 71 = Pressure sensor
- 81 = Obstacle database (e.g. incorrect file type)
- 82 = Obstacle database expired.
- 91 = Flight recorder
- 93 = Engine-noise recording not possible
- A1 = Configuration error, e.g. while reading flarmcfg.txt from SD/USB.
- B1 = Invalid obstacle database license (e.g. wrong serial number)
- B2 = Invalid IGC feature license
- B3 = Invalid AUD feature license
- B4 = Invalid ENL feature license
- B5 = Invalid RFB feature license
- B6 = Invalid TIS feature license
- 100 = Generic error
- 101 = Flash File System error
- 110 = Failure updating firmware of external display
- 120 = Device is operated outside designated region. The device does not work.
- F1 = Other

Vertical indicator shows severity levels:

fatal problem, device will not work	functionality may be reduced	information only, i.e. normal operation	no error, i.e. normal operation
			

7 Installation

7.1 Connecting LXNAV FlarmBat

LXNAV FlarmBat is connected to DC power supply using PF POWER 12 VDC cable. Red wire goes to + positive and blue wire goes to – ground.

External indicator can be connected via a splitter or directly to the other port.



Instrument has no internal fuse. **3A external fuse is required!**

7.2 Connecting Antennas

FlarmBat has 3 connectors for different antennas. Two SMA connectors (A and B) are for Flarm Antennas and there is one antenna for the ADSB (optionally).

Following Flarm Antennas are available:

- Short Dipole (90°) $\lambda/4$
- Long dipole (90°) $\lambda/2$
- Flat folded dipole
- Classic dipole
- Antenna with ground plate



For better range, Flarm antennas must be positioned vertically.

For additional information about installation you may have a look at:



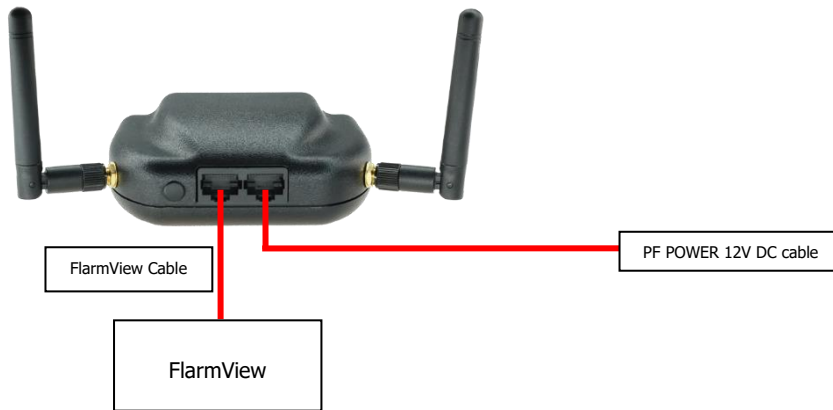
<https://flarm.com/wp-content/uploads/man/FTD-041-Application-Note-FLARM-Antenna-Installation.pdf>

7.3 FlarmBat pinout

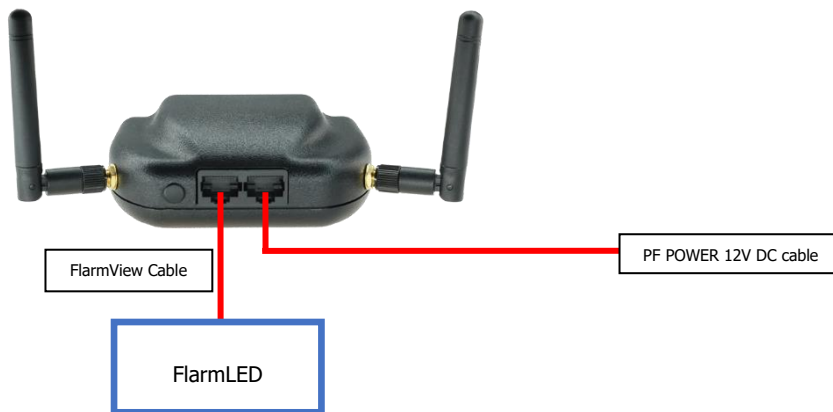


Pin number	Description
1	GND
2	GND
3	(input) Receive to LXNAV FlarmBat RS232 Level
4	(output) Transmit from LXNAV FlarmBat RS232 Level
5	Ground
6	3.3V power supply (output) – for external display (LED)
7	12V IN
8	12V IN

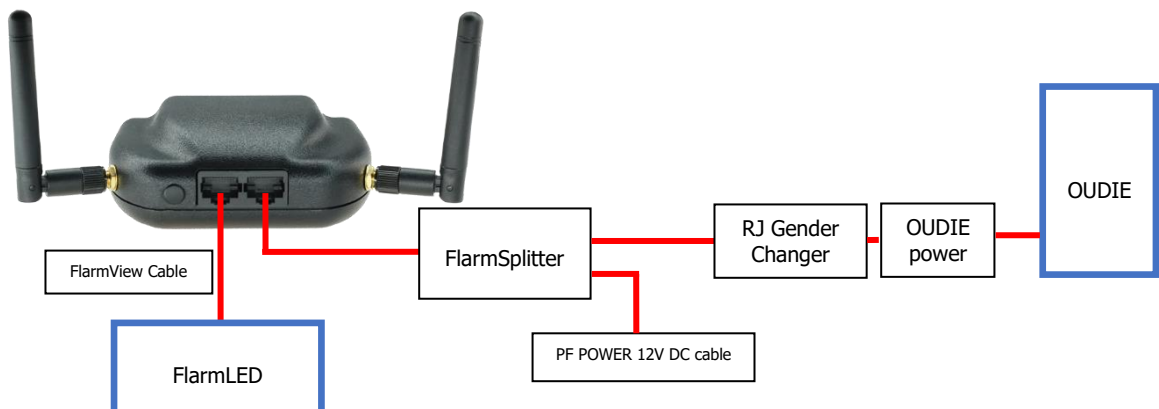
7.3.1 FlarmBat – FlarmView



7.3.2 FlarmBat – FlarmLED



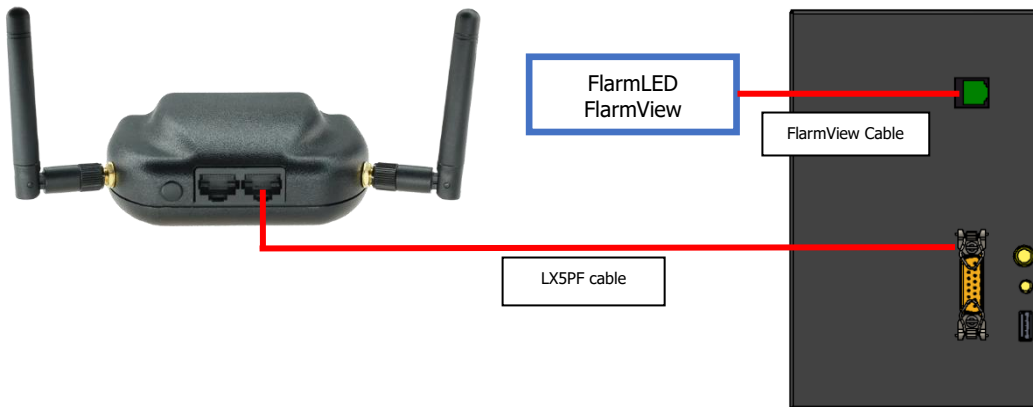
7.3.3 FlarmBat – FlarmLED – Oudie



7.3.4 FlarmBat – FlarmView – Sxxx Vario

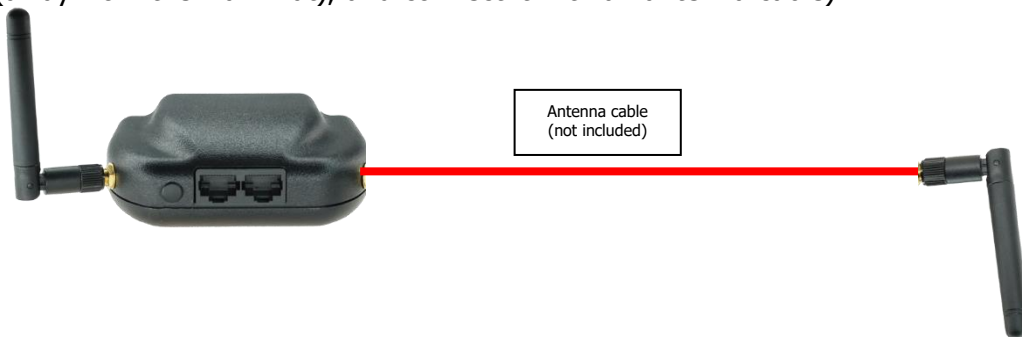


7.3.5 FlarmBat – LX9xxx – FlarmView



7.3.6 Flarm antenna wiring

To maximize efficiency of two Flarm antennas it is advisable to place them as far apart as possible and pointing in different directions to reduce signal blind spots. They can be both mounted on the device itself as pictured above but it is better to place one of them remotely (away from the FlarmBat), and connect it with an antenna cable).



8 Data transfer

8.1 Firmware update

Flarm firmware can be updated via micro SD card. Just copy firmware to SD card, insert it and power on FlarmBat. Firmware can be downloaded on LXNAV-Downloads-Firmware section. ADSB and LED display having same firmware which can be updated with procedures described below.



Update of the FlarmBat display without integrated ADSB module is not possible.

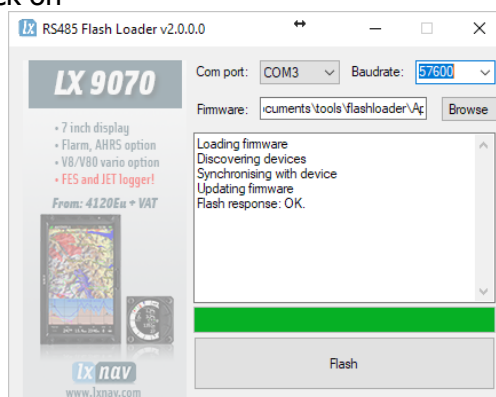
8.1.1 ADS-B/LED display firmware update via Flash Loader

This method is used if you wish to update an ADS-B module in FlarmBat. You can get flash loader at: <https://gliding.lxnav.com/lxdownloads/firmware/> (S7 PC update tool) or Oudie (PNA update tool).

For the update you need file named **App_FABA_X.XX.lxfw** (x= version nr.) on your computer.

Update procedure:

- Switch off the Flarm and connect it to your PC via Port 2.
- Select communication port to which your FlarmBat is connected to
- Select baudrate 57600
- Browse for firmware (.lxfw file)
- Press Flash
- Turn the device back on



To update ADSB module, a cable Flarm update 12V DC is required and a Comm port on PC.

8.1.2 ADS-B/LED display firmware update via LXxxxx

If FlarmBat is connected to LXxxxx via LX5PF cable connected o Port 2 on FlarmBat, firmware update can be performed directly from LXxxxx. If LXxxxx has no built in Flarm, just enter password 89891 and select file with ADSB firmware **App_FABA_X.XX.lxfw**.

In case you have built in Flarm and connected external FlarmBat, before update procedure described above, enter password 49147.

8.2 Configuring FlarmBat



Traffic data will be present only if baud rate is set to 19200 or higher.

8.2.1 Configuring FlarmBat+ via Wi-Fi

Wi-Fi connection between FlarmBat+ and smart phone can be established simply with scanning the QR code on the FlarmBat+ housing or manually. The password for FlarmBat+ Wi-Fi access point is as well on the label near the QR code. If the main flight declaration screen will not appear automatically in a browser, you can open a browser and enter **192.168.1.1**



FlarmBat (not plus version) can be configured the same way by using FlarmLink dongle.

8.2.1.1 Flight declaration screen

On this screen user can enter the pilot's and glider information.

lxnav [person icon] [gear icon] [menu icon]

FLIGHT DECLARATION

Pilot
Lordi

Copilot
undefined

Glider type
Cirrus VTC

Registration
D-7127

8.2.1.2 Flarm settings screen

Can be entered by pressing to the top status bar a setting icon.



FLARM SETTINGS

Device type

PowerMouse

Current port

Port 1

Distance unit

Meters

Altitude unit

Meters

8.2.1.3 Pull down menu

The following list of pages will appear on the pull-down menu.

- FlarmStatus
- CarpRange analyzer
- Traffic monitor
- Logbook
- FlarmUpload License file
- FlarmUpload Obstacle file
- FlarmUpload firmware
- FlarmLink information
- FlarmLink Wi-Fi setup
- FlarmLink Bluetooth setup
- FlarmLink database update
- FlarmLink sound settings
- FlarmLink Button settings



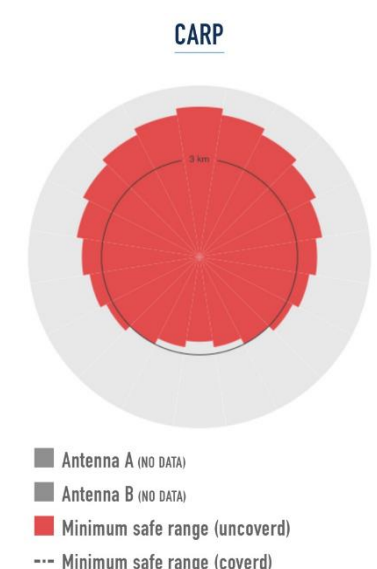
8.2.1.3.1 FlarmStatus

On that screen you can see the status of the GPS, flarm and ADSB receiver. Information about the Flarm and ADSB firm wares, loaded obstacle databases,...

<p>ADSB INFO</p> <p>Hardware: 1 Firmware: 1.41 SN: 666 FPGA Ver: 8 AdsbRxOk: 4 AdsbRx: 0</p> <p>NMEA STREAM</p> <pre> 8.0.0.0*49 SPLXVC.A,ABC,34,595*68 SPFLAU.0,1,1,0,0,...*63 SPGRMZ.807,F,2*35 SGPRMC,133707.00,A,4614.09156,N,01516.62451,E,0.042,128324,...,A,Y*00 SGP6GA,133707.00,4614.09156,N,01516.62451,E,1.09,0.95,278.4,M,42.2,M,...*5E SGP6SA,A,3.25,28.31,24.27,18.23,05.29,...,1.63,0.95,1.32,1*1F SPLXVI,1,618,0,0*49 SPLXVC.A,ABC,34,595*68 SPFLAU.0,1,1,0,0,...*63 SPGRMZ.810,F,2*33 </pre>	<p>FLARM STATUS</p> <p>GPS status: 3D Latitude: N 46.234861 Longitude: E 15.277074 GPS altitude: 320 m Number of satellites: 9 Tx: Transmission Rx: 0 Pressure altitude: 245 m</p> <p>FLARM INFO</p> <p>SW version: 7.21 HW version: 1.1 IGC version: EmptyPlaceholderObst</p>
--	---

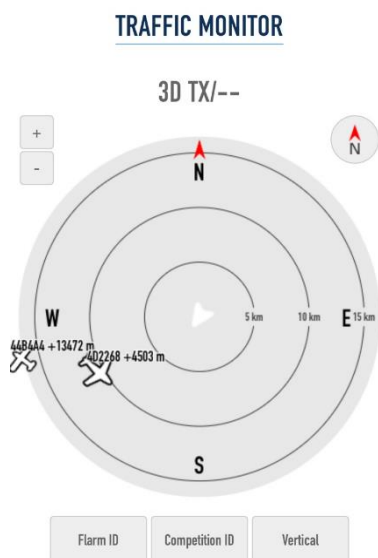
8.2.1.3.2 Carp Range

Carp range will show us the receiving performance of our flarm device for each antenna separately.



8.2.1.3.3 Traffic monitor

Here we can observe live flarm and ADSB traffic. By each target is possible to show labels for FlarmID, competition ID and its vertical distance.



8.2.1.3.4 Logbook

If the flarm has flight recorder capability, you can download the flights here. Flights are in IGC file format.

8.2.1.3.5 FlarmUpload License file

This menu is useful only if the customer wants to activate one of available flarm licenses, that are not active yet (eg. ENL license).

8.2.1.3.6 FlarmUpload Obstacle file

Flarm obstacle database can be loaded here.

8.2.1.3.7 FlarmUpload firmware

Flarm firmware can be laded here. Be sure, you have downloaded first the firmware form our web site, section downloads/firmware.

8.2.1.3.8 FlarmLink information

FlarmLink info is the information about FLarmLink interface (Wi-Fi). For further improvements, it can be updated here.

FLARM LINK INFO

Serial number: 666
Hardware version: 1
Software version: 1.00

FLARM LINK UPDATE

Update file
No files selected

Step 1

BROWSE

Step 2

8.2.1.3.9 FlarmLink Wi-Fi setup

On this page user can change the Wi-Fi password and Wi-Fi name (SSID).

WIFI SETTINGS

Wifi password

Wifi password (repeat)

Wifi name (SSID)

SAVE



In case that you have forgotten the password or you don't know it, you can make a factory reset, if you press on an input button (short button wires), power on the FlarmBat+ and keep pressing it for 10 seconds.

8.2.1.3.10 FlarmLink Bluetooth setup

Bluetooth name can be changed here.

BLUETOOTH SETTINGS

Bluetooth name

FLARM BT link - 666

SAVE

8.2.1.3.11 FlarmLink database update

On that page user can load OGN database

8.2.1.3.12 FlarmLink sound settings

For each level of alarm, the user can set the type of the warning (quiet – no alarm, beeping or voice)

The initial volume can be set here.

If you press the TEST button, you can hear on audio output, what type of the warning is selected.

SOUND SETTINGS

Initial volume level

High Volume

New Traffic Alarm Type

Beep

Low Alarm Type

TEST

Short Voice

Important Alarm Type

TEST

Short Voice

Ugent Alarm Type

TEST

Short Voice

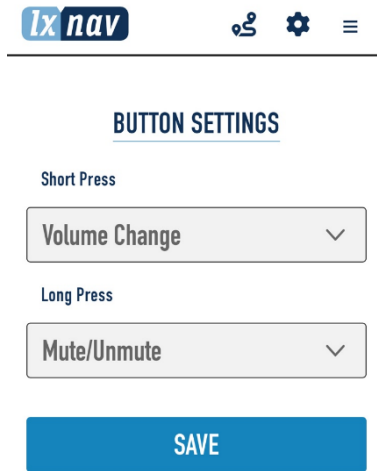
SAVE

8.2.1.3.13 FlarmLink Button settings

In this menu a digital input/button function can be configured. Button can be pressed short (click) or long (1sec). To each method can be applied one function. Following functions are available:

- Volume change
- Mute/Unmute
- Pilots event
- Mute/Unmute for 5 minutes

Each action on the button is supported also with voice message. If you press "Volume change", You will hear "high volume", "medium volume", "low volume". For Mute/Unmute you will hear "mute" or "unmute",....



8.2.2 Configuring FlarmBat settings PowerFlarmConfig

PowerFlarm config is available in download section of our web page:

<https://gliding.lxnav.com/lxdownloads/software/>

Here you can set all settings for your FlarmBat device. File will be saved as flarmcfg.txt file, which you should save on the micro SD card. To load this file into FlarmBat, insert micro SD card in FlarmBat and switch it ON. File will be automatically loaded into device. You can configure existing flarmcfg.txt, which is present on micro SD card.



For Bluetooth to operate properly, bound rate of the port must be set to 19200bps. If you changed bound rate for any other purpose (ex. updating) make sure to set it back to 19200bps if you want to use Bluetooth on that port.

8.2.3 FlarmBat configuration by using Flarm configuration tool

FlarmBat can be configured by Flarm Tool software which can be found here:
<https://flarm.com/support/tools-software/flarm-configuration-tool/>



In Farm tool are not supported all features, that can be configured for FlarmBat.

HOME - SUPPORT - TOOLS & SOFTWARE - FLARM CONFIGURATION TOOL

FLARM CONFIGURATION TOOL

When installing FLARM in an aircraft, and before using a portable FLARM, it is very important that it is configured correctly. Use the configuration tool below to configure your device. After selecting the desired options, the configuration file is instantly downloaded.

Note that the configuration tool only works with the latest released firmware version. Before configuring the device, you need to update to the latest firmware version, independently of when you did the last firmware update.

We take the privacy of your data seriously and you can find our Privacy policy [here](#).

My devices
 Log in to see your devices

New device
 Manufacturer:
 LXNAV

Device:
 FlarmBat

START CONFIGURATION

BLOG

- **2019-01-31** New 2019 Obstacle Data Available
 MORE
- **2019-01-07** Fully-automated long-range UAV flights
 MORE

Obstacles 2019

The updated Obstacle databases for 2019 are now available in our shop.

Create Config file:

- Select "New device" and choose "LXNAV" and "FlarmBat"
- Click on the button: Start configuration

Edit configuration file:

- After pressing button described above multiple options will show.
- Configure and adjust them to your liking
- More settings are available by checking "Show advance settings"

Show advanced settings

ICAO 24-bit aircraft address, hexadecimal

Official 24-bit ICAO aircraft address in hexadecimal notation, as issued by local CAA. It consists of six hexadecimal characters (0-9, a-f) and can be obtained from the aircraft papers. Must match the address configured in the Mode-S transponder. If the aircraft does not have a Mode-S transponder, it's possible to leave the field empty to use the device specific radio id. Enter "0" (zero) for random id (not recommended, will make Search and Rescue (SAR) very difficult).

Aircraft type

The configured aircraft type will influence motion prediction and collision risk algorithms and warnings for both the own aircraft as well as other aircraft. Ensure that you select the correct type.

Data sentences on data port 1

According to instructions from the display/equipment manufacturer.

Protocol version for data port 1

"Version 4" is typically supported by all displays. Select a higher version if the display supports it to have access to all functions. Select "Version 3" if Data sentences is configured as Garmin TIS.

Baud rate for data port 1

Baud rate (bit rate). Must match setting in attached display/equipment. Select at least 19200 for advanced functions.

Protocol version for data port 2

Protocol to be used. "Version 4" is typically supported by all displays. Select a higher version if the display supports it to have access to all functions.

Baud rate for data port 2

Baud rate (bit rate). Must match setting in attached display/equipment. Select at least 19200 for advanced functions.

Transponder type

Type of transponder that is installed in the aircraft.

CREATE CONFIG FILE

Edit advance settings:

- Do this the same way as described above for standard settings

Logging interval (seconds)
Applicable for IGC flight recording.
4 (Default) ▼

Remove all IGC files?
Deletes all IGC files from the device. Restarts the device.
 Yes
 No (Default)

Remove obstacle database?
Deletes the obstacle database (if installed) from the device. Restarts the device.
 Yes
 No (Default)

Pilot name
Applicable for IGC flight recording.

Co-pilot name
Applicable for IGC flight recording.

Glider ID
Applicable for IGC flight recording.

Glider type
Applicable for IGC flight recording.

Competition class of glider
Applicable for IGC flight recording.

Competition ID
Applicable for IGC flight recording.

Stealth mode
Hides tactically relevant flight data for usage at competitions. Receiving stations may use the received data for the purposes of traffic safety only or with a time delay of 10 minutes. Tactical data like climb rate are omitted or randomized.
 Enable
 Disable (Default)

No-Track mode
Enhanced privacy mode. Receiving stations may use the received data for the purposes of traffic safety only. If enabled, Search and Rescue (SAR) based on data received by ground stations is not possible.
 Enable
 Disable (Default)

Create config file:

- Click button "Create config file"
- File (FLARMCFG.txt) will automatically be downloaded to your computer



To load this file into FlarmBat, copy it on micro SD card, insert it into FlarmBat and switch it ON. File will be automatically loaded into device.

8.3 OGN registration

Flarm can be registered to Open Glider Network (OGN). For registration, you will need Flarm ID number. It is 6 digit hexadecimal code. It can be found on several places.

- IGC file
- Flarm config file (flarmcfg.txt)

For OGN registration, please visit following web site:

<http://wiki.glidernet.org/ddb>

After successful registration, your flarm device will be visible on several OGN portals.

<https://live.glidernet.org/>

<https://glidertracker.de/>

8.3.1 IGC file

If you open IGC file with notepad, you must search for ID as follows

```
AXFL8AQ
HFDATE:161220
HFDTL161220
HFFXA500
HFFLTPILOTINCHARGE:undefined
HFCM2CREW2:undefined
HFGTYGLIDERTYPE:undefined
HFGIDGLIDERID:undefined
HFDTMGPSDATUM:WGS84
HFCCLCOMPETITIONCLASS:undefined
HFCIDCOMPETITIONID:undefined
HFRFWFIRMWAREVERSION:FLARM, 6.67
HFRHWHARDWAREVERSION:1.0
HFFTYFRTYPE:PowerFLARM
HFGPSRECEIVER:u-blox 8,56ch,50000m
HFPRSRESSALTSENSOR:MEAS MS5607,25000m
IQ23638FXA3940SIU
LFLA06024907FRW 6.67
LFLA060249 STEALTH OFF
LFLA060249 NOTRACK OFF
LFLA060249ID 2 D01580
LFLA060249OB
LFLA06024907OBSTEXP
LFLA06024907DEVNO FLANGA10W-005504
LFLA06024907BUILD a072808ac
LFLA06024907RANGE 65535
LFLA06024907ACFT 8
LFLA06024907THRE 2
LFLA06024907FREQ 100
LFLA06024907CFLAGS 00
```

8.3.2 Flarm CFG file

If you plug into PowerMouse empty USB memory stick, a NGAxxxx.TXT file will be copied on it, and where xxxxx is internal serial of FLARM module. If you open the file, you will find Flarm ID at the bottom as follows:

```
.
.
.
00078.362 INFO CONFIG cap = DP2;USBH;BARO;IGC
00078.366 INFO CONFIG region = ALL
00078.367 INFO CONFIG build = f746001a7
00078.368 INFO CONFIG deviceid = FLANGA10W-004100
00078.368 INFO CONFIG radioid = D01580
00078.369 INFO CONFIG idType = 2
00078.382 INFO PFAPP Starting PowerFLARM application
00078.382 INFO PFAPP Cleaning up FFS...
00078.472 INFO PFAPP Initializing command parser and RPC server on Data Port #1
00078.476 INFO PFAPP Initializing command parser and RPC server on Data Port #2
```

8.4 Saving flight on the micro SD card

The last 20 flights will be downloaded at every switching on (only if the micro SD card is inserted). If there are already some of the 20 flights on the Micro SD card, they will not be downloaded again. That means: if you have been flying a lot without downloading flights, the download procedure will take some time, so don't switch off. To download one flight after landing perform the following procedure: Wait a 3 minute after landing. Then switch off power for at least 5 sec. Insert the Micro SD card (in case it's not already inside) and switch on again.



The collision avoidance functionality does not depend on the status of the Micro SD card (inserted or not)

8.5 Updating the obstacle database

The firmware update will be executed, when the system finds a file with the extension ***.obs.** on the USB stick root. The procedure runs identically to the firmware update and takes a few minutes. Please delete the obstacle file from the USB stick after the update.

All data must be in the USB stick root directory. Folders and subfolder are not allowed. Names of the files shall not be changed.



Loading new obstacle database will overwrite the old obstacle database



File format FAT16 or FAT32 and USB 2.0 type is supported.



FLARM Tools is used only for Classic FLARM and is not compatible with PowerMouse.

Obstacle database can be purchased on official Flarm web site www.flarm.com, section products/obstacles.

Under manufacturer, please select LXNAV

For device, please select PowerMouse

New device

Manufacturer:

Device:

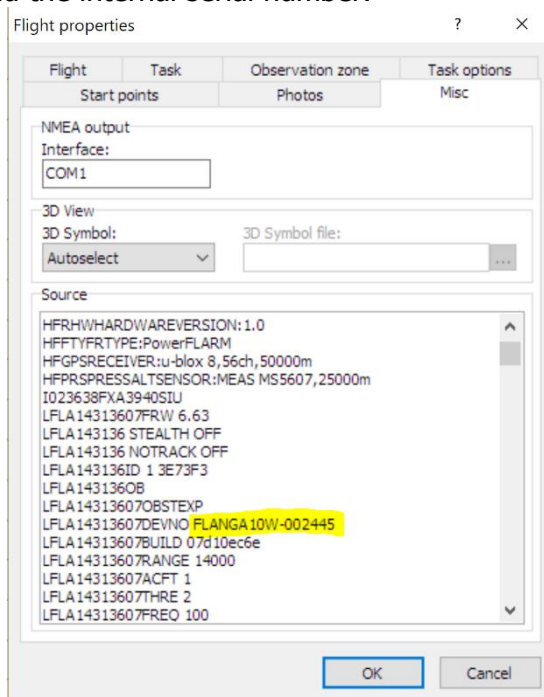
Click here to access the device manual with instructions on how to find the internal FLARM serial number. The serial number has the form FLANGA10W-001234. Do not use the serial number of the PowerMouse.

(Internal) FLARM Serial Number:

Internal serial number is available in IGC file. You will find it in following format:

LFLA14313607DEVNO FLANGA10W-**002445**

If you open IGC file with notepad, please search for text "FLANGA10W". If you open IGC file with SeeYou, please right click and select flight properties, then Misc, scroll down for approximately one page and you will find the internal serial number.



All FlarmBats logging IGC logs, even they don't have IGC option. FlarmBat without IGC option will have IGC flight without signature and will be not valid for badges or OLC.

8.6 Declaring tasks

Flarmcfg.txt files can also contain task declaration.

You can declare the task on PowerMouse in three possible ways:

- If connected to S8x/10x vario from the vario
- If connected to LX80xx/90xx system from the unit
- Via USB stick

In order to declare task via USB stick you will need PowerFlarmConfig software already mentioned in previous chapters.

To declare task, go under "Declaration" and define pilots and airplanes parameters. By pressing "Load" button you upload the .cup waypoint file from which you can then select points for flight declaration. After you are done editing you save and transfer the file to the device the same way as described in chapter 6.2.1.

PowerFLARMConfig v1.2.5

Declaration

Settings

Pilot

Pilot:

Copilot:

Glider type: Registration: IGC Approved device

Class: Competition ID:

Task: 243.4km, Triangle

Declaration date: četrtak, 16. julij 2020 11:39:33

Task name:

	Name	Latitude	Longitude	Distance	Course
Start	Celje/AD	N46.2431°	E015.2222°		
1. Point	Maribor/Ad	N46.4825°	E015.6895°	44,7km	53°
2. Point	Lesce/Ad	N46.3611°	E014.1722°	117,1km	264°
Finish	Celje/AD	N46.2431°	E015.2222°	81,7km	99°
*					

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PowerFLARMConfig is updated to version 1.2.3.

9 Error codes

- 11 = Firmware expired (requires valid GPS information, i.e. will not be available in the first minute or so after power-on)
- 12 = Firmware update error
- 21 = Power (e.g. voltage < 8V)
- 22 = UI error
- 23 = Audio error
- 24 = ADC error
- 25 = SD card error
- 26 = USB error
- 27 = LED error
- 28 = EEPROM error
- 29 = General hardware error
- 2A = Transponder receiver Mode-C/S/ADS-B unserviceable
- 2B = EEPROM error
- 2C = GPIO error
- 31 = GPS communication
- 32 = Configuration of GPS module
- 33 = GPS antenna
- 41 = RF communication
- 42 = Another FLARM device with the same Radio ID is being received. Alarms are suppressed for the applicable device.
- 43 = Wrong ICAO 24-bit address or radio ID
- 51 = Communication
- 61 = Flash memory
- 71 = Pressure sensor
- 81 = Obstacle database (e.g. incorrect file type)
- 82 = Obstacle database expired.
- 91 = Flight recorder
- 93 = Engine-noise recording not possible
- A1 = Configuration error, e.g. while reading flarmcfg.txt from SD/USB.
- B1 = Invalid obstacle database license (e.g. wrong serial number)
- B2 = Invalid IGC feature license
- B3 = Invalid AUD feature license
- B4 = Invalid ENL feature license
- B5 = Invalid RFB feature license
- B6 = Invalid TIS feature license
- 100 = Generic error
- 101 = Flash File System error
- 110 = Failure updating firmware of external display
- 120 = Device is operated outside designated region. The device does not work.
- F1 = Other