USER MANUAL

FlarmLink

Rev#1

1   Important Notices and safety information

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

The LXNAV PowerMouse system is designed for VFR use only as an aid to prudent navigation. All information is presented for reference only.

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 is shown for parts of the manual which should be read carefully and are important for operating the LXNAV FlarmLink system.

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

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

1.1 Limited Warranty

This LXNAV FlarmLink 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 option, 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, 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.

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.

August 2019

1.2 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.

(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.rbrc.org/

1.3 Declaration of Conformity

FC C E

1.3.1 FCC

Product:	FlarmLink
Type reference:	ESP32-S3-WROOM-1
Manufacturer:	LXNAV d.o.o., Kidričeva 24, 3000 Celje, Slovenia
Trademark:	LXNAV
FCC ID:	2AC7Z-ESPS3WROOM1
Operating frequencies:	2.4GHz Wi-Fi & BT
	Frequency 2402.0MHz - 2480.0MHz 10.9mW
	Frequency 2412.0MHz - 2462.0MHz 359.7mW
Ratings:	8-36VDC
Testing Method:	FCC rule part 15C

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 importer is responsible for this declaration:

Company name:
Company address:
Telephone:

1.3.2 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

FlarmLink

Manufacturer

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

Related standards
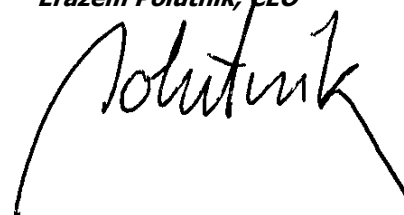
RED directive 2014/53/EU

Remark

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

Safety	EN 62368-1:2020+A11:2020
Health	EN 50665:2017
EMC	EN 301 489-1 V2.2.3
Radio	EN 300 328 V2.2.2

Celje, 18.03.2024   *Authorized signature*
                                                                   Erazem Polutnik, CEO

2 General overview

FlarmLink is an interface for connecting third party devices with flarm device via FlarmLink module. It can be interfaced via Wi-Fi or Bluetooth interface.

FLARM is the collision avoidance system and traffic awareness/electronic conspicuity technology used by General Aviation, light aircraft, and UAVs. It has been designed to support self-separation for both VFR and IFR in applicable airspace classes. Aircraft with a FLARM system alert the pilots when on a collision course with another aircraft. Similar to TCAS/TAS, visual and aural warnings indicate that a collision is imminent, requiring the pilots to take action. However, unlike TCAS, FLARM does not issue Resolution Advisories (RA), so pilots need to select the appropriate course of action themselves.

FLARM works by calculating and broadcasting its own predicted future 3D flight path to nearby aircraft. At the same time, it receives the future flight path from surrounding aircraft. An intelligent motion prediction algorithm calculates a collision risk for each aircraft based on an integrated risk model.

The system determines its position, altitude, and movement with a sensitive GNSS/GPS receiver. Based on those and other parameters, a precise projected flight path can be calculated. The flight path, together with additional information such as an identification number, is encoded before being broadcast over an encrypted radio channel twice per second. Flight models are available for most aircraft types, including piston-engine airplanes, jets, helicopters, gliders, hang gliders, paragliders, UAVs, etc.

PowerMouse also incorporates an ADS-B and transponder (SSR) Mode-S receiver. This enables aircraft that are not yet equipped with FLARM to also be detected and included in the collision prediction algorithm.

FLARM was invented in 2004 following an increasing number of mid-air collisions. Research and accident investigations had shown that the see-and-avoid principle was insufficient to reliably detect approaching aircraft in time. It initially spread in the domain of non-powered aircraft but was soon followed by rapid expansion in powered airplanes and helicopters. Over 50,000 manned aircraft and many more UAVs already have a FLARM-system installed. In Europe, more than 50% of all General Aviation aircraft have FLARM (including nearly 100% of gliders). The technology has additionally spread to other parts of the world and is today also used most prominently in North and South America, Australia, New Zealand, South Africa, Israel, and some Asian countries.

In addition to annunciating collision warnings, many FLARM systems can also show nearby aircraft on a radar-like screen (CDTI). Similar to the use of weather radar to avoid thunderstorms, this can be helpful for short to medium term strategic planning in high traffic density situations.

FLARM can also warn about fixed obstacles like masts and power lines. Obstacle collision warnings are based on an optionally installed database, which needs to be kept up to date.

FLARM systems are available from many different manufacturers under different product names. A system normally consists of a remotely installed FLARM device, a panel-mounted FLARM Compatible display, one or two externally mounted FLARM antennas, and internally mounted GNSS and ADS-B/SSR antennas. There are also portable FLARM devices available (usually with an integrated display), as well as FLARM systems integrated into other avionics (e.g. EFIS-systems).

FLARM is approved by EASA and others for installation in certified aircraft and is recommended by many aviation authorities and organizations. The installation is normally a minor change and can be done by any competent maintenance organization. Several General Aviation airports have started requiring FLARM for all aircraft. FLARM is also mandatory in France for gliders and a similar requirement for light powered aircraft is under investigation.

3   Packing Lists

- FlarmLink (dongle)
- Short User manual

4 Basics

4.1 LXNAV FlarmLink at a Glance

FlarmLink is a module that can be plugged in any standard flarm port. After established Wi-Fi connection, user can set up all settings of the flarm, download flights, upload obstacles, updates firmware of the flarm. The connection between FlarmLink and flarm is established automatically.

4.1.1 Interfaces
- RJ45 Flarm interface
- Wi-Fi/Bluetooth

4.1.2 Technical Data

FlarmLink
- Power input 8-36 V DC
- Consumption up to 1,17W
- Weight 10 g
- 60mm x 25mm x 10mm
- Operating temperature -20°C to +60°C (-4°F to +140°F)
- Storage temperature -40°C to +80°C (-40°F to +176°F)
- 2.4 GHz Wi-Fi (802.11 b/g/n) and Bluetooth® 5 (LE) module
- Frequency 2402.0MHz - 2480.0MHz 10.9mW
- Frequency 2412.0MHz - 2462.0MHz 359.7mW

4.1.2.1 Environmental limitations
- Operating temperature -20°C to +60°C (-4°F to +140°F)
- Storage temperature -40°C to +80°C (-40°F to +176°F)
- Relative humidity: 0%-95%
- Vibration: +/- 50m/s^2 at 500Hz

5 System Description

Please scan the QR code on the FlarmLink module. Your smart phone will connect automatically to the FlarmLink access point. Via a web browser you can configure all FlarmLink settings.
Bluetooth interface can be as well enabled here.
Until the Wi-Fi connection is established, Bluetooth connection is not possible. Same is if Bluetooth connection is established, Wi-Fi connection will not work.
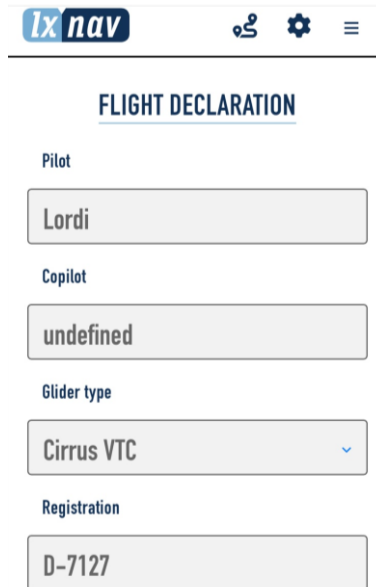
6 Installation

Simply plug in the unit into the standard flarm RJ45 socket.

7   Use of the FlarmLink

Wi-Fi connection between FlarmLink and smart phone can be established simply with scanning the QR code on the FlarmLink housing or manually. The password for FlarmLink 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**
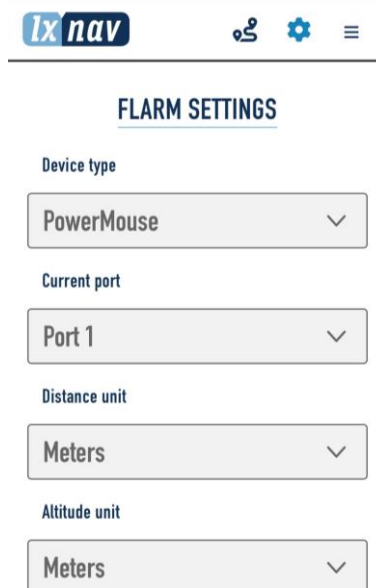
7.1   Flight declaration screen

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

7.2   Flarm settings screen ⚙

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

7.3 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
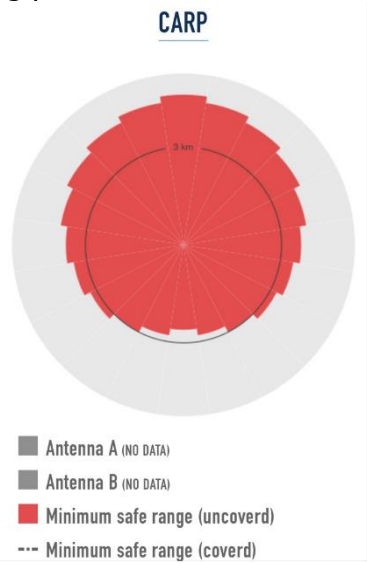- FlarmLink database update

7.3.1 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,…

ADSB INFO

Hardware:	1
Firmware:	1.41
SN:	666
FPGA Ver:	8
AdsbRxOk:	4
AdsbRx:	0

NMEA STREAM

```
0,0,0,0*49
$PLXVC,A,AGC,34,595*6B
$PFLAU,0,1,1,1,0,,0,,,,*63
$PGRMZ,807,F,2*35
$GPRMC,133707.00,A,4614.09156,N,01516.62451,E,0.042,,120324,,,A,V*00
$GPGGA,133707.00,4614.09156,N,01516.62451,E,1,09,0.95,278.4,M,42.2,M,,*5E
$GPGSA,A,3,25,28,31,26,27,18,23,05,29,,,,1.63,0.95,1.32,1*1F
$PLXVI,1,618,0,0,0*49
$PLXVC,A,AGC,34,595*6B
$PFLAU,0,1,1,1,0,,0,,,,*63
$PGRMZ,810,F,2*33
```

FLARM STATUS

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

FLARM INFO

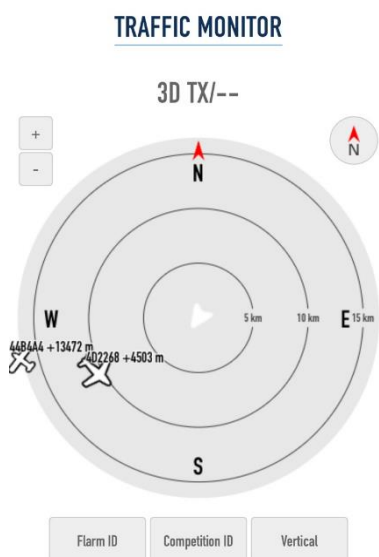|	
SW version:	7.21
HW version:	1.1
IGC version:	EmptyPlaceholderObst

7.3.2 Carp Range

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

CARP

- Antenna A (NO DATA)
- Antenna B (NO DATA)
- Minimum safe range (uncoverd)
- Minimum safe range (coverd)

7.3.3 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.

7.3.4 Logbook

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

7.3.5 FlarmUpload License file

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

7.3.6 FlarmUpload Obstacle file

Flarm obstacle database can be loaded here.

7.3.7 FlarmUpload firmware

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

7.3.8 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

7.3.9 FlarmLink Wi-Fi setup

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

WIFI SETTINGS

Wifi password

password

Wifi password (repeat)

password

Wifi name (SSID)

FLARM WIFI Link – 666

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 PowerMouse+ and keep pressing it for a 10 seconds.

7.3.10 FlarmLink Bluetooth setup

Bluetooth name can be changed here.

BLUETOOTH SETTINGS

Bluetooth name

FLARM BT link – 666

SAVE

7.3.11 FlarmLink database update

On that page user can load OGN database

8 Revision History

Rev	Date	Comment
1	March 2024	Initial release of this manual

The pilot's choice