XCFlarmView User Manual

Manual edition 1.06

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1.   Description

The XCFlarmView is a sunlight readable IPS LCD display based small size Flarm display to automatically **visualize traffic nearby** without need for zooming or any other user intervention in flight.
The system which is manufactured in large numbers is not expensive, comes readily built up and tested, is an excellent add-on for any kind of Flarm featuring a standard IGC port. The SW keeps being extensible as an open source software, buildable in your own clone on github.

It features a **wired serial connection** for a stable and latency free connection and mostly works by plug and play with any Flarm on the market, and may operate in parallel to other devices on the same serial interface. Software Update is possible via WiFi.

Below there is a sample of the elements in the main screen. In the middle you find your own airplane surrounded by a one km (1000 meters) or about half mile (0.62 miles), safety zone. Any target outside of this zone is printed as a **green** acute **triangle** pointing with its tip towards the direction it is heading. All positions and directions are **relative** to your own heading. The triangles are zoomed **larger** when the traffic is real close.
The color of the triangle changes to the best visible color white in case the target enters the safety zone around your glider. In case there is a **Flarm alarm**, an **audible warning** is alerted via the buzzer, with an increasing frequency according to the Flarm alert level according to the table below.

Flarm Alert	Tone played	Beeps per Second	Frequency
1 (lowest)	D#	3	2489
2	E	5	2637
3 (highest)	F	7	2794

The closest target is encircled and its info is shown at the edges of the display.
Var or **Var**iometer shows the current variometer of the target if its Flarm is not operating in stealth mode. The unit displayed can be chosen in the setup for all three measures.
Dis or **Dis**tance is the diagonal distance to the glider not only in horizontal, also in vertical direction. A glider may be horizontally near, but at a different altitude, so another one may the most dangerous one.
Alt or **Alt**itude is the relative altitude of the target,
ID or **Id**entity is either the Flarm ID, or the registration of the target in case there exists one in the FlarmNet database shown at startup.
There is the "ID button" next to the ID field to cycle through the Flarm targets that are currently received.
If there is no more active received signal of a target, the symbol begins to fade.

The **alarm info** field on the left side will show alarm e.g. **failed GPS** or **TX** status of the connected Flarm device.
If there is no Flarm connected, those alarms will appear and need to be cleared by a valid status from the Flarm.

Var(iometer)   Dis(tance)

Alarm
Info Field

Alt(itude)   ID (Registration or Flarm-ID)

2.   Features

- Black anodized durable aluminum housing

- Works with any Flarm featuring a serial connection

- Open Source Arduino programmable (https://github.com/iltis42/XCFlarmView)

- OTA SW update

- Audio volume adjustable

- Target selection by ID button

- Flarmnet database already include in software

- Regular SW builds for recent Flarmnet DB and released in github

- 2.4 kHz Buzzer with 85 dB (@ 10cm) for traffic notification (head up)

- Inside USB 2.0 Type B female USB Jack for factory load
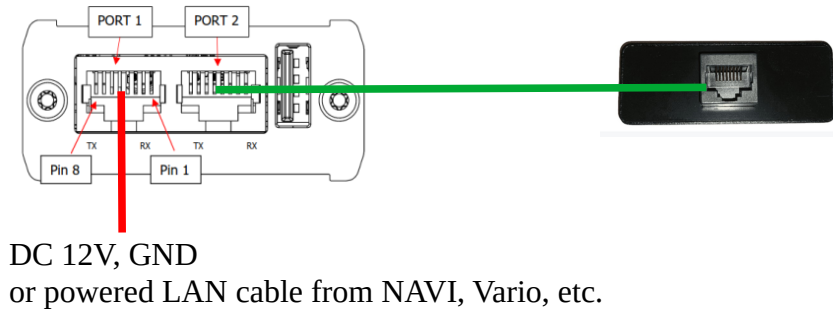
3.   Installation

The XCFlarmView may be installed instead of any other Flarm Display, Flarm LED Display or traffic monitor in the instrument panel of the glider, or on top of the panel, wherever is enough space to fit a horizontal 64 * 25 mm display with a central RJ 45 connector at the rear side.

The device shall be connected with a RJ45 cable to a Flarm operating at least at 19200 baud, better **57600** baud are recommended for baudrate in order to be able to see all Flarm targets as of its multi-target capability. The device will automatically detect the correct baudrate and will save the baudrate in the configuration for a quick start. The device needs to be powered via the RJ45 interface, normally this comes from the Flarm already that is connected to DC, in case your Flarm doesn't feature this and needs to be powered itself, an Y-Piece with all jumpers plugged is the answer to this.

3.1. Power Flarm Fusion, Redbox Flarm with extra DC wires:

DC 12V, GND   Flexible LAN cable 50cm
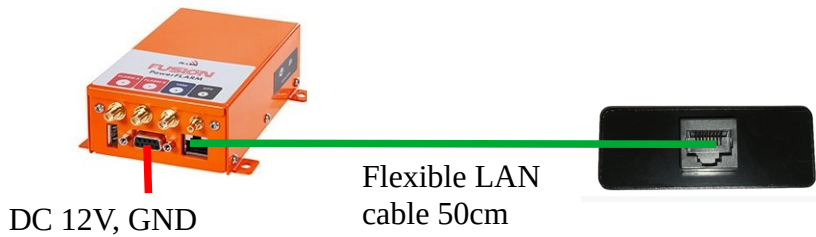
3.2. Power Mouse or other Flarm with a second IGC port for powering:

DC 12V, GND
or powered LAN cable from NAVI, Vario, etc.

3.3. Classic Flarm or other Flarm without DC:

Y-Piece RJ45 8P8C, all jumpers plugged

DC 12V, GND
or powered LAN cable from NAVI, Vario, etc.
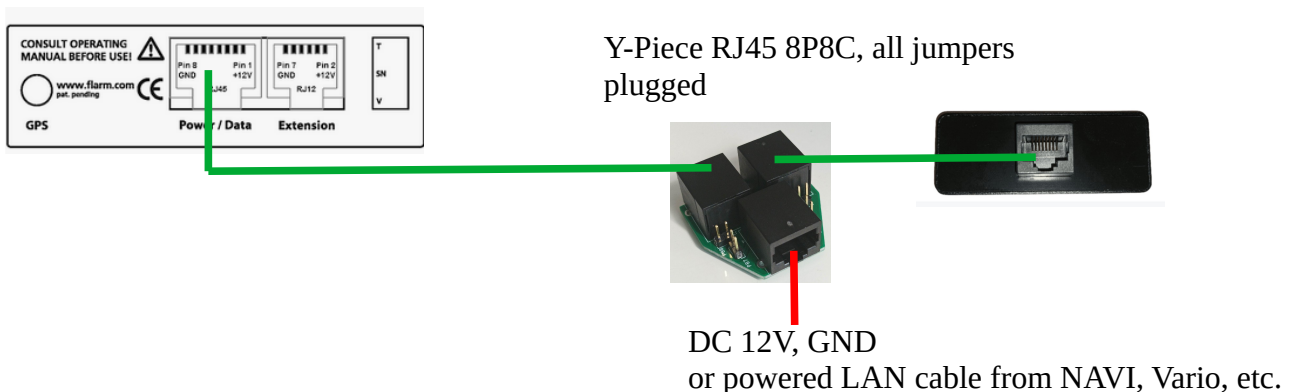
4. Setup

Setup is activated by a **long press**, longer than half a second to the **ID button**. To navigate between items or altering an item is to be done by **short press** and enter or leave one level down in the menu by long press. Using this two button gestures, the setup menu can be navigated and altered to any value. A **long press** saves changed information of a selected item, confirms by printing "Saved" and automatically goes up one level to select the next item or return to normal operation by a final long press. The system automatically reboots after leaving the setup menu to takeover the new setup in the operative mode.
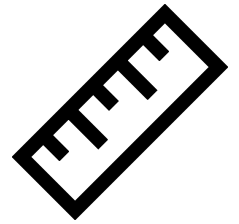
4.1. Volume

100%

This item is used for volume control of the buzzer. 100% is the default setting for ~ 85 dB at 10cm distance. Lower values may be chosen and confirmed by long press to the ID button.
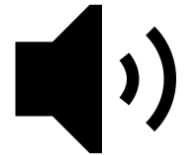
4.2. Units

For international use, units for the **Var**iometer, **Alt**imeter and **Dis**tance can be set to according to imperial preferences. The setting options are as below, the defaults are printed in bold.

4.2.1. Altitude

[Meter (m)]
[Foot   (ft)]
[Flightlevel (FL)]

4.2.2. Vario

[Meter/sec (m/s)]
[Feet/min x 100 (fpm)]
[Knots (knots)]

4.2.3. Distance

[Meter (m)]
[Feet (ft)]

4.3. Traffic Demo

[Cancel]
[Start]

The traffic demo can be launched by selecting the [Start] entry plus a long press to the ID button and then back in the main menu by a second long press to leave the setup menu. The demo shows targets from a recorded flight also with an alarm occurring after several seconds. The demo play's about two minutes, then normal operation.

5. Electrical connections

The XCFlarmView comes with a 8 pin RJ45 female connector standard IGC assignment for the serial port with power, GND and two serial RX/TX wires. The serial TX is unused and set to a high impedance, means there is no restriction to add this Flarm display in parallel with any other device.

Pinout of serial connector S1 on the back side.

Pin RJ45	Direction	XCFlarmView S1
1	power in	GND
2	power in	GND
3	signal out	RS232 TTL TX (not used, high impedance)
4	signal in	RS232 TTL RX
5	NC	-
6	NC	-
7	power in	+8..16V
8	power in	+8..16 V

6. SW Update

The device is capable for software update **Over The Air** (OTA) via its own WiFi access point. **First** you need to **download** the new SW from this github page with the latest releases to your device, e.g. an android phone, iphone, tablet or PC: https://github.com/iltis42/XCFlarmView/releases

Then, to update the SW, you may press the ID button on the frontpanel in the first two seconds while the device is powered with 12V from the RJ45 connector and the splash screen appears with a notice "Press Button for SW-Update". The XCFlarmView will now enter the OTA software update mode.

Then use your mobile, tablet or PC to connect to the WIFI network **ESP32-OTA**.

The **WIFI password** is **esp32-ota** its same as the WIFI name, hence all letters lowercase.

Note: There will be **no internet** connection once you are connected with the XCFlarmView for update, in case of corresponding warnings and pop-ups on your device just confirm and **ignore**.

When connected to the XCFlarmView's WIFI, then launch e.g. google chrome web browser and enter URL **http://192.168.4.1** to open the OTA SW update webpage.
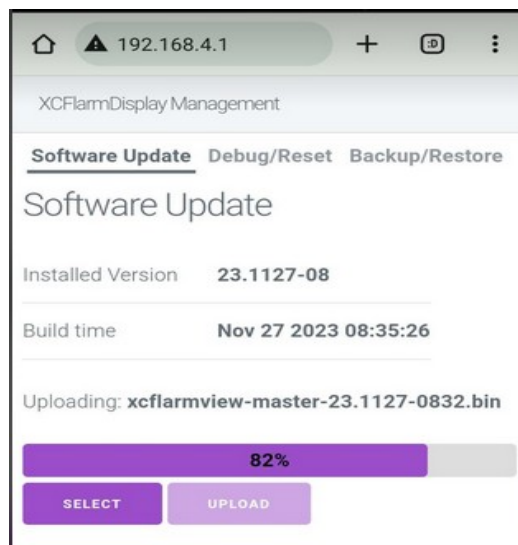
There you can select the new software .bin (here German language **[Datei auswählen]**, engl. **[File select]**) file, you might got from github, and press **[Update]**, and after a couple of seconds all is done. The software update is fine and you can power cycle your XCFlarmView with the new software when the update page shows 100% and software download success.

7.   Technical specifications

Operating System	ESP32-S2 esp-idf 4.4.5
Wireless Interfaces	WiFi 2.4 GHz
Display Brightness	900 Nits
Display Surface	Antiglare and Anti-Fingerprint
USB Interface (hidden)	1x USB 2.0 B female plug (inside, not accessible for users)
RJ45 Interface	8 Pin standard IGC Connector
Power consumption	~60 mA @ 12V DC equal 0.6 W in normal operation
Dimensions	63,6 * 24,5 * 6.9 mm (* 20 mm with RJ45)
Weight	17g

8.   Maintenance

The device does not require any maintenance. The aluminium surface is resistive to cleaning liquids. Storage shall not be done in a humid environment. Ensure that relative humidity will not exceed 100% in order to avoid condensation and avoid direct contact with water.

9.   Warranty Policy

For the XCFlarmView, the manufacturer provides a warranty of two years from the date of purchase with regard to the effort and material costs of the repair. Within this period, components that fail under normal operating conditions will be repaired or replaced free of charge, provided the device was sent to the manufacturer free of charge.

The warranty does not cover damage resulting from misuse, abuse, accidents, unauthorized modifications or repairs, proven incorrect or faulty wiring, over-voltage or fire or mechanical damage.

The warranty does also not cover such issues that can be easily corrected by a SW update on user site.

According to the German Civil Code, the return can be made within 14 days of the date of purchase. In this case, the device and its accessories must be returned by the buyer to the address from which it was delivered. The buyer bears the costs for this.

10. Permit

For each instrument, if the equipment is part of the minimum equipment list or requires approval, it may only be installed if the supplier or manufacturer provides a document on the proper check for compliance with the respective specification of the individual piece of equipment, area of EASA this is usually the EASA Form One.

For all **other equipment**, as well as for standard parts, a corresponding examination and documentation of the same is not required (e.g. device, final approach computer, flight data recording devices, navigation computer, additional antennas, batteries, cameras, additional pressure probes, mosquito cleaning systems, etc.). This is regulated in detail by EASA in AMC 21.A.303(c) 2, with the following wording:

AMC 21.A.303(c) Standard Parts

1. In this context a part is considered as a **'standard part'** where it is designated as such by the design approval holder responsible for the product, part or appliance, in which the part is intended to be used. In order to be considered a 'standard part', all design, manufacturing, inspection data and marking requirements necessary to demonstrate conformity of that part should be in the public domain and published or established as part of officially recognized Standards, or

2. For sailplanes and powered sailplanes, where it is a **non-required instrument** and/or equipment certified under the provision of CS 22.1301(b), if that instrument or equipment, when installed, functioning, functioning improperly or not functioning at all, does not in itself, or by its effect upon the sailplane and its operation, constitute a safety hazard.

'Required' in the term 'non-required' as used above means required by the applicable certification specifications (CS 22.1303, 22.1305 and 22.1307) or required by the relevant operating regulations and the applicable Rules of the Air or as required by Air Traffic Management (e.g. a transponder in certain controlled airspace).

Examples of equipment which can be considered as standard parts are, variometers, bank/slip indicators ball type, total energy probes, final glide calculators, **navigation computers**, data logger / barograph / turnpoint camera, bug-wipers and **anti-collision** systems. Equipment which must be approved in accordance to the certification specifications shall comply with the applicable ETSO or equivalent and is not considered a standard part (e.g. oxygen equipment). The XCFlarmView is considered as a part of a anti-collision system and therefore runs as non required equipment. The aircraft can be operated even without any anti-collision system.

This means that **no EASA Form One** is required for the XCFlarmView.

Note:
After installation, the equipment list of the aircraft must be adjusted. A relevant change in center of gravity due to the additional mass of 0.017 kg is not to be expected, in doubt a weighing must be carried out and the change has to be approved.

11. Limitation of Liability

With the purchase of the device, the customer agrees that no liability for any direct or indirect damage, claims for damages or consequential damages of any kind and on any legal basis arising from the use of the device.

This device is a purely extention for traffic awareness, it is not part of the required equipment for gliders, and in case of a defect or malfunction, there is no restriction to navigate the aircraft savely. The device therefore does not require any FAA or EASA approval.

12. CE Declaration of Conformity

C E

DECLARATION OF CONFORMITY

XCVario, owner Dipl. Ing (FH) Eckhard Völlm, Panoramastr. 86/1, D-71665 Vaihingen/Enz, explains that in the normal configuration the device hardware meets the requirements of the CE.

The EMC compatibility corresponds to EN 301 489-3:2002-08 for a Class 3 SRD device (equipment type I).