

NANO⁴

Flight recorder

Version 1.02



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1 Important Notices

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 organisation of such changes or improvements.



A Yellow triangle is shown for 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 is shown 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 labour, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident, or unauthorised 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.

1.2 Battery information

NANO4 is powered by a rechargeable battery. 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.

Unplug the charger from the electrical plug and the device when not in use. 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 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 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.



1.2.1 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 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.

1.2.2 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 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.

2 Packing Lists

In the box you will find:

- NANO⁴ flight recorder with preloaded Nanoconfig program and user manual which is loaded on the USB stick



- Micro USB cable



- Wall charger with Micro USB plug



- Level converter (Only with NANO⁴ up to serial number 06099)
- Barogram calibration chart

3 Basics

3.1 NANO⁴ at a glance

The NANO⁴ flight recorder is the smallest flight recorder designed in accordance with the IGC "All Flights" specification. It has an IGC approval for all flights including world records. It features an integrated 56-channel GPS receiver with built-in antenna, altitude sensor, ENL sensor, security micro-switch, Bluetooth module, WiFi module and 2800mAh battery.



The operational temperature for the NANO⁴ is from -20°C(68°F) to +60°C(140°F). Higher temperatures may cause the battery to inflate.

The built-in battery allows up to 25 hours of stand-alone operation. The battery can be charged when the flight recorder is connected to a computer, NanoPower or wall charger. Bluetooth is used for easy data exchange with a PDA.



The housing is made of robust ABS plastic. On the right side of the unit there are a zoom buttons.

A 4 GB solid state disk is used for flight data storage. Flights are stored directly in IGC format and are downloadable through a USB connection which is compatible with all operating systems (MS Win, Linux and Mac OS).



On the left side of the unit there is a small hole with a reset button. Use a pin to press the reset button if a reset is required. In normal operation, this button should never be used.



At the top of the unit there is a micro USB connector, this is used for charging and data transfer. Beside micro USB is power button.

The internal solid state disk is preloaded with the Nanoconfig program and NANO⁴ Manual. This program is used for uploading a flight declaration and/or changing the settings of the NANO⁴. Flight declarations can also be uploaded using a serial interface cable or Bluetooth connection by third party applications (SeeYou, XCsoar) or NanoConfig for Android.

3.2 Technical data

Hardware

- ARM
- 4GBytes memory solid state memory
- VGA 640*480 colour pixel TFT sunlight readable LCD
- 56-channel GPS receiver
- Engine noise level sensor
- Pressure altitude sensor measuring up to 16000m

Input and output

- USB interface (mass storage device)
- Serial RS232 interface for PDA connection
- Bluetooth interface for PDA connection
- Wi-Fi interface

Size and weight

- Outline dimension: 106x70x18mm
- Weight: ~150g

3.3 Power button

A long press to power button will power on NANO⁴. When NANO⁴ is running, short press to power button will lock NANO⁴ screen and shut down the backlight of the screen. Another press will turn on back the screen. Long press, when screen is on will show menu with power off or lock screen option.



When flying, a press of the power button for a short time, a pilot initiated event will be recorded and the flight recorder will then log 30 fixes with a recording rate of one second.

3.4 Side buttons

The side buttons has several actions. (Zoom, Volume, up/down in menu)



Pressing side buttons will increase or decrease the sound volume when on an info page. On pages with the map, those buttons has a zoom function. In the setup page, you can move through each menu.

3.5 Four push buttons

NANO⁴ has four push buttons, which have a dynamic function.



The function of each push button is described on the label adjacent to the button

The functions of buttons are mostly related the current page (waypoint, task, Flarm, info, setup). If there is no label next to the button, this button has no function.



3.6 LED

On the top left corner of NANO⁴ is multi-colour LED indicator.

At power on:

- Blue is on, as much is necessary to hold power button.
- In case of any failure (security check, battery check) flashes red with one Hz period

Bluetooth operation (only, when screen is off):

- At initialization flashes blue fast with 5Hz period
- In normal operation flashes blue every two seconds 2s

Battery (When screen is off):

- When NANO⁴ is not charging, flashes every 10 seconds
- When NANO⁴ charging, flashes red every 2 seconds, until is full (green)
- When state of charge is less than 10% flashes red, below 30% is yellow, otherwise red.

Power off:

- All the time, while we holding power button, the red is on.



LEDs show the status only when the LCD is off.

3.7 ALS (Ambient light sensor)

On the top right side is ambient light sensor. If you have enabled automatic LCD brightness, ALS will adjust the brightness of the screen.

3.8 NanoPower cable

The NanoPower cable is a special device which converts 12V to 5V providing a power supply for the NANO⁴ and a PDA. It also translates a serial signal to match the NANO⁴ signal level and a PDA or computer signal level.



Nano Power is an option for NANO⁴.



Connect the red and black wire to 12V power supply. Red is positive.



Maximum input voltage is 24 Volts.



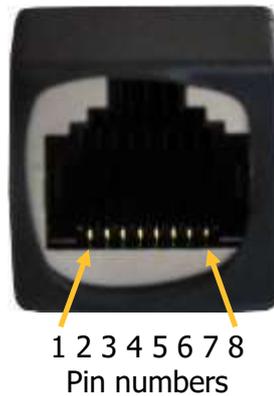
NANO⁴ up to serial number 06099 need additional level converted for connection to Nano power. This converter is included in NANO⁴ box.

The NanoPower has two plugs. On one side there is a standard USB-A connector. Please use the included USB-A to mini-USB cable and plug the NANO⁴ on this side. Any standard USB-A to mini-USB cable can also be used. On the other side there is an RJ45 plug. This plug is designed for a PDA or a computer.



The RJ45 plug is NOT designed in accordance with the IGC standard. It can be used only with a dedicated cable. Do not plug any unknown cables in to it as this may damage the NanoPower circuit.

Pin description on the NanoPower RJ45 is given in the picture below.



Pin number	Description
1,2	Ground
3	(output) Transmit from NANO ⁴ RS232 (e.g. Computer, V7)
4	(input) Receive to NANO ⁴ RS232 (e.g. Computer, V7)
5	(output) Transmit from NANO ⁴ LVTTL (e.g. Oudie, HP302)
6	(input) Receive to NANO ⁴ LVTTL (e.g. Oudie, HP302)
7,8	5V OUTPUT (maximum 1A)

3.8.1 Available cables for NanoPower

Device	Cable code
OUDIE	CC-NP-OUDIE1
Generic RS232 with female DB9	CC-NP-232
IPAQ 310/314	CC-NP-IPAQ310
IPAQ 38/39xx/47xx	CC-NP-38
MiniMap	CC-NP-LX
Butterfly Connect	CC-NP-BFC
Flarm	CC-NP-IGC
NanoPower for PowerFLARM	NanoPower-PF
NanoPower for Flarm	NanoPower-FL

4 Operation

There are two modes of operation: **Data transfer** mode and **Normal operation** mode. When in the data transfer mode, flights can be downloaded and the NanoConfig program can be run. Normal operation mode is when the logger is ready for recording flights. The mode in which the NANO⁴ is operating can be determined from the main screen or LEDs, when the screen is off.

In **data transfer mode**, there will be a message on the screen "USB connected", whereas in the **normal operation mode**, the screen will display data only.

4.1 Powering on

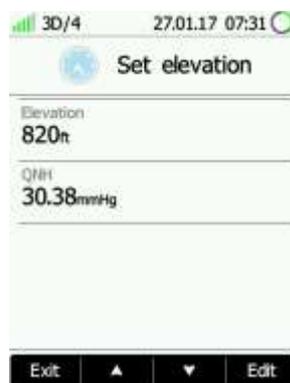
There are three ways to power on the NANO⁴ flight recorder.

Press power button and the NANO⁴ will power on. It will go directly to normal operation mode. On start up, a splash screen will appear with information containing the Serial number and version of firmware. The NANO⁴ will then go into normal operation mode.

Connect the NANO⁴ to a computer using a USB cable. It will automatically power. At the same time you will see the first message "USB connected" and later "USB mounted", when the connection is established. This indicates that the NANO⁴ flight recorder is in data transfer mode. You may now run the NanoConfig program or copy flights using standard methods for copying files. You can exit to normal operation mode with pressing to any button. If Nano is in data transfer mode and USB cable is unplugged, NANO⁴ will shut down.

Connect the NANO⁴ to **NanoPower cable.** The NANO⁴ will then automatically power on and after approximately 20seconds the NANO⁴ will go into normal operation mode.

Normal operating mode starts with a message "**Loading elevations**" and "**Set elevation**"



When the NANO⁴ acquires a GPS fix, it will switch to the GPS info page. The user can at any time, cancel the acquiring page by pressing any button. Acquiring a GPS fix may take between a few seconds and a few minutes, depending on the satellite constellation and the NANO⁴ position. The NANO⁴ has a very sensitive GPS receiver which can sometimes acquire a GPS satellite signal in a room.



If you press any button, when in the data transfer mode, the NANO4 will revert to normal operation mode

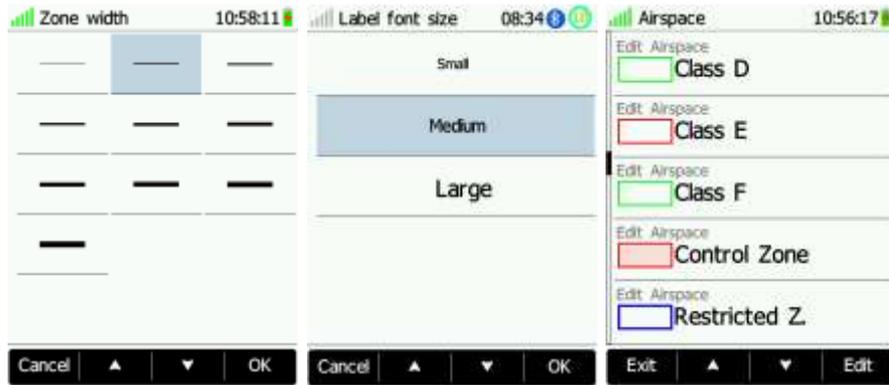
4.2 User Input

The NANO⁴ user interface consists of many dialogues, which have different input controls. They are designed to make input of names, parameters, etc., as easy as possible. Input controls can be summarised as:

- Text editor
- Spin controls (Selection control)
- Checkboxes
- Slider control
- Line width control
- Colour selection
- "Hamburger" menus

To move the function from one control to another, use **up** or **down** buttons. By pressing the **Edit** button access to the control that is displayed is possible.

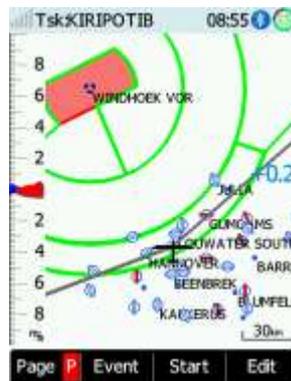




4.2.1 Buttons on NANO⁴

Buttons have dynamically set functions. When you press a button, on the button side, will appear a blue labels, with the action assigned to that button in that context.

On main screen, top button always performs the function of switching between pages. Short press will cycle in one direction between pages. Long press will cycle in the opposite direction between pages. A number of pages look similar initially as the cycling between them simply change the zoom level. The screen will momentary will be updated to reflect the new zoom level. The number in a zoom level icon shows us the outer circle radius (2km – depends on distance units setting). Inner circle is half of that distance.



Middle buttons help with target selection by cycling through available targets. Lower button has EDIT function, where we can edit/view the currently selected target.

4.2.2 Text Edit Control

The Text Editor is used to input an alphanumeric string; the picture below shows typical options when editing text. Use keyboard on touch screen or up/down button to change the value at the current cursor position.



Push button **next** will move cursor right. Long press on **next (P)**, will move cursor left. At last character position, push button will confirm edited value, long press **Ok. (C)** will cancel editing and exit that control. If Long press is available, part of button label is in Red color. For example above, left button's long press **Next P** has back function. Right button's long press has Cancel function.

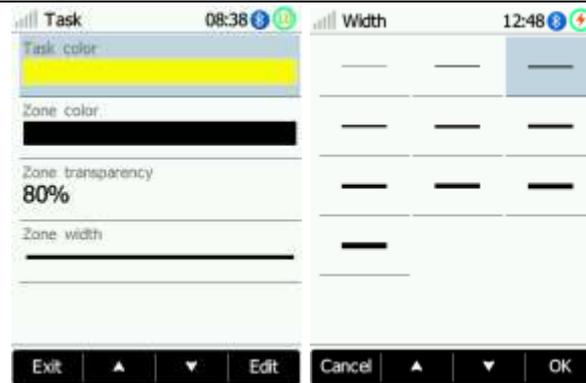
4.2.3 Selection Control

Selection boxes, also known as combo boxes, are used to select a value from a list of predefined values. Use the up/down buttons to select the appropriate value.



4.2.4 Line width selection

Line width boxes, are used to select a line width from a list of predefined widths. Use the up/down buttons to select the appropriate width.



4.2.5 Color selection

Color selection boxes, are used to select a color from a list of predefined colors. Use the up/down buttons to select the appropriate color.



4.2.6 Checkbox and Checkbox List

A checkbox enables or disables a particular parameter. Press **EDIT** button to toggle the value. If an option is enabled a check mark will be shown, otherwise an empty rectangle will be displayed.



4.2.7 Slider selector

Some values like volume and brightness are displayed as a slider



With **Edit** or press on that area of the screen you can activate slider control, then **up/down** buttons or slide on screen you can select the preferred value and confirm it with the **Ok** push button.

4.2.8 Spin control

With using touch screen, user can increment or decrement selected value. Same action is possible also with buttons.



4.3 Normal operation

During normal operation mode, the user can use the NANO⁴ as a flight recorder, simple navigation, vario system and Flarm radar display. There are four pages (information page, waypoint page, task page, setup page and Flarm radar). You can read more about pages in Ch.5.1. If the screensaver function is enabled, the screen will go off after the set time period in seconds. When the screen saver is on, the pilot can still see the indicated status of the NANO⁴ by monitoring LED.

4.3.1 Calibration of battery

Battery can be calibrated in the following way.

1. NANO⁴ must be fully charged
2. NANO⁴ is fully charged, when charge current drops below 5mA or there is a message FULL
3. Disconnect the supply cable and leave the NANO⁴ running until it shuts down due to an empty battery



To be sure, that the NANO⁴ is really in discharge mode, the Battery Status row of the INFO page text will show "DIP", which means Discharge In Progress.



We can increase the speed of the discharge cycle, if we turn on Bluetooth module, set up brightness of LCD to maximum, turn off screen fade.

After this procedure NANO⁴ has measured its battery capacity and with the next charge, the indication will be more accurate.

Calibration of battery is performed during production of nan NANO⁴. In case that calibration data is wrong, calibration cycle is necessary for correct indication of the charge level.



If charge level does not shows correct value, comparing to the battery voltage, battery calibration cycle is necessary to be done. Example: Charge level: 99% and measured voltage 3.6V.

4.4 Powering off

Press the power button for a long time and the red LED will be on until shuts down.

4.5 Security void

When the security (secret key) is lost at power on, the red light will be blinking and "DIGITAL SIGNATURE FAILED" message will appear on the screen. To continue press any button. Device will be fully functional, however the flight will not be signed.



In order to produce the IGC-certified files, the NANO⁴ flight recorder must be returned to the dealer or manufacturer for resealing.

4.6 Charging battery

The battery will be charged when the NANO⁴ is connected to the external power through a usb port. It can be charged from a wall adapter, or directly from a PC or from the NANO⁴ power cable.

If you want to charge faster, then you must connect the NANO⁴ to a power supply, wait for it to boot up, then press the rocker button to switch the unit off. In this mode all the NANO⁴ functions (GPS, Bluetooth, Memory) are turned off, this will increase the charging speed. In this mode the NANO⁴ can be fully charged in approximately 6 hours. The LCD screen is still on, but the backlight is off. It is still possible to monitor the level of charge. The level of charge is also visible via the LED.



Sometimes it may appear that the NANO⁴ battery level when connected to a charger looks full. When you then disconnect the power, the battery level drops to 90%. This is normal as the battery level indication is different when the charger is connected and when it is disconnected. To really fully charge the NANO⁴, please continue charging for a few hours. In fast charge this time will be shorter. Charge current must drop close to 0mA or you will see indication FULL.

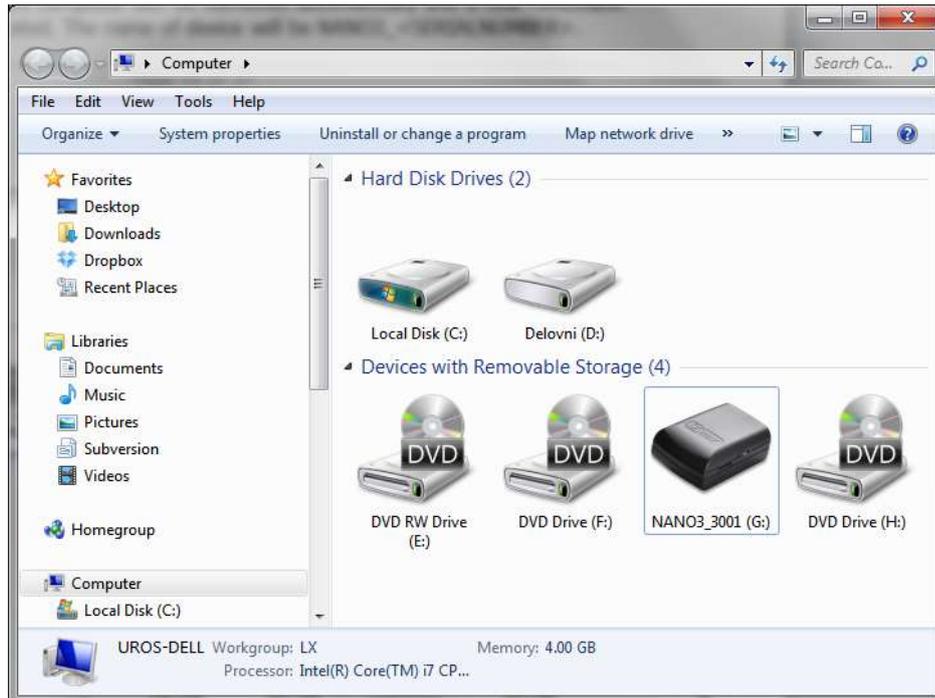
4.7 Connecting to a computer

NANO⁴ can be connected to PC if it's off or on. If it is off, it will connect automatically. In case, that is already powered on, NANO⁴ will ask you if you want to connect to computer.

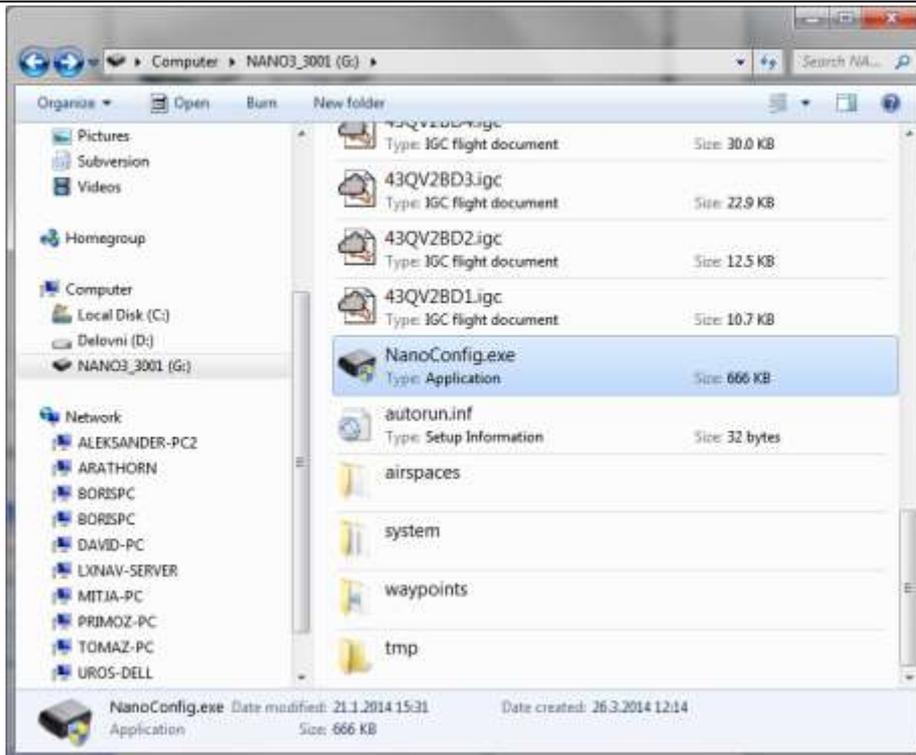


If NANO⁴ is connected to computer during flight and user confirms USB connection, flight will be forced to finish.

Connect it to a computer using the supplied USB cable or any other standard USB-A to mini-USB cable. The NANO⁴ flight computer will be identified automatically and a new removable storage device will be indicated. The name of the device will be NANO4_<SERIALNUMBER>.



Open this device to see its content.



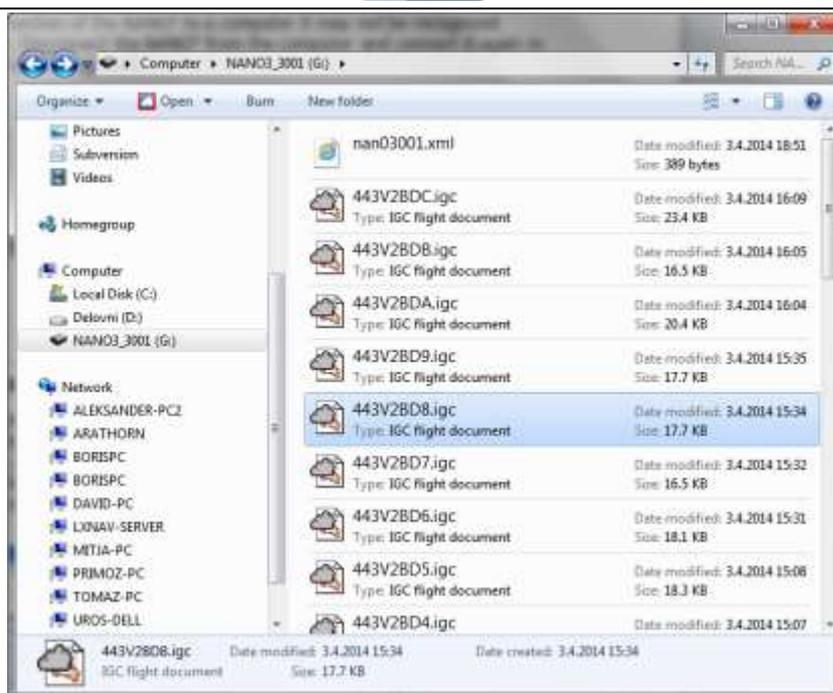
In the root folder you will find the flights created by the NANO⁴ and the NanoConfig program. The NanoConfig program will run only on Microsoft Windows operating systems. Double click to run it.



On the first connection of the NANO⁴ to a computer, it may not be recognized immediately. Disconnect the NANO⁴ from the computer and connect it again in order for it to be recognized.

4.8 Downloading flights

Turn off the NANO⁴ and connect it to a computer using a USB cable. Navigate to the root folder of the NANO⁴ and use your preferred method of copying files.



Flights are stored in files with the IGC standard filename. If you find it difficult to decode this standard, we recommended that you switch to detailed view to see the date of the file. In detailed view, the file date and time shows the landing time of the glider.

Flights can also be downloaded using the NanoConfig for Android devices. More details are in Ch.7.4.

4.9 Bluetooth pairing

In order to connect to the NANO⁴ via Bluetooth you have to search on a PDA for Bluetooth enabled devices in range. (See chapter 7.2.2.5 to enable Bluetooth) The NANO⁴ will be identified as LXNAV-NANO4-<SERIALNUMBER>. Click PAIR or CONNECT to connect to the NANO⁴. A security pin must be entered. The pin code for the NANO⁴ is 1234 and cannot be changed.

4.10 Storing Nano⁴

The NANO⁴ must be stored in a dry environment with temperature lower than 25°C (77° F). If the NANO⁴ will not be used for an extended time, it is recommended that you charge the battery to 50% beforehand.

The NANO⁴ and the BATTERY have protection circuits which protect the battery from being overcharged or overly discharged. If the NANO⁴ is stored with an empty or near empty battery, eventually the battery will be discharged so far that it will not be possible to charge it again.

4.11 Replacing the battery

User cannot replace the battery in NANO⁴. Replacement of battery can be done only by authorised dealer. When NANO⁴ housing is opened, the digital signature will be lot and flights will not be signed any more. Reseal from authorised dealer is necessary.

5 Working with the NANO⁴

5.1 Tree structure

The NANO⁴ has four modes, info, Waypoint, Task and Setup mode. Info mode has two subpages, where you will find all the necessary information about the status of the NANO⁴.

Info	Flarm	Waypoint	Task	Setup

5.2 Main navigation screen description

The main navigation screen consists of a map with coloured airspace, waypoints with names or task (depends on which page you are looking at), vario tape on the left and status bar on the top. The vario tape and vario dynamics can be configured in the Setup-Hardware-Vario menu. If you don't want to see the vario tape, you can switch it off. The status line indicates the status of the GPS, indicates the chosen waypoint that you are navigating to, the status of the Bluetooth device, the battery level and local time. Menu buttons appears, when you press any one of the buttons. Each button has its own function which is described on the button label. The functions of buttons are mostly related to the page where you are (waypoint, task, flarm, info, setup). If there is no label on the button, this button has no function.

Battery level can be displayed in two ways, with the classic battery level indicator or round progress with number inside, which indicates remaining hours. Outside progress indicates percent of the battery level. When the remaining time is calculated to be less than 1 hour, the indication becomes red and the inside number means remaining minutes, the outer ring is progress for last hour (60 minutes).



Classic battery indication



Indication of battery with remaining time



Indication of charge level, when battery is charging

When the battery is charging the indication is as follows: Inside symbol indicate charging, outer ring is percent of charge.

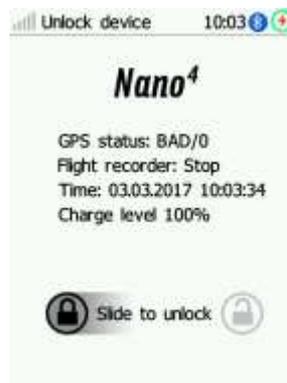
The accuracy of battery life measurement depends on how accurate the battery capacity has been measured. More about battery calibration can be read in chapter:4.6. In the centre top of the map is the "off course" (steering course) indicator, which helps the pilot fly in the right direction.



At the bottom of the map screen are four nav boxes, which can be chosen by user. With long press on nav box, user can select by many nav box options.

5.3 Locked screen

Screen can be unlocked with sliding finger over the screen.



On locked screen is information about flight recorder status, GPS status, Time, State of charge and remaining time of battery. More details are in ch.7.1.2

5.4 Info screen

On the info screen, is available data about GPS, Battery and Flight recorder status.

5.5 Flarm screen

Flarm screen is visible only when the NANO⁴ detects a Flarm connected to the external port. Selection of Flarm targets and zooming is then available. If the NANO⁴ is connected to PowerFlarm, it is also able to show PCAS traffic.

Distance	Ce	Altitude
2.5km	-0.0%	220m
2.5km	-0.0%	220m

5.6 Waypoint screen

In this screen, the pilot can navigate to a selected waypoint, **Select** waypoint from opened CUP file, or select landable waypoint from near list **Near**.

Name	Brg
ROGLA	24.9km 011°
CRNI VRH	28.1km 353°
LEMBERG SL	9.8km 346°
ZRECE STADION	17.8km 030°
SLOVENJ GRADEC	29.0km 335°



Long press on map will bring near airport/waypoint selection menu around pressed place on map.

5.7 Task screen

In this screen user can navigate to waypoints from a task, switching between them, edit task points and their zones. More on Ch. 7.1.3



5.8 Setup Menu

5.8.1 QNH

Under this page, the pilot can change the QNH setting. If QNH setting is correct, NANO⁴ will show correct altitude.



Wrong QNH setting will have effect only on wrong altitude warnings and wrong final glide calculation. QNH setting has no influence over the recorded altitude in the IGC file

5.8.2 Flight recorder

Under this page; flight recorder, pilot information and glider data are configured.

- **Pilot** name must be entered here
- **Co-Pilot** name must be entered here, if glider is double seater.
- **Competition sign** of glider
- **Registration** of glider
- **Recording interval** sets the interval when the GPS position will be stored in flight
- **Auto Finish** will allow the automatic finish of the flight, under certain conditions. Uncheck this item for wave flying. (ground speed is used to indicate the end of a flight and in wave it is possible to be stationary or even fly backwards in relation to the ground)
- **Auto Off** will power off the NANO⁴ 30 minutes after the flight is finished
- **Logger always on** will force the logging/write position to an IGC file immediately after power on. Normally the NANO⁴ logger is triggered by ground speed exceeded 40km/h or vario over 1m/s. This function is recommended to be enabled only for hang gliders.

- **Pilot weight**
- **CoPilot weight**



5.8.3 Display

Under this menu the following items can be set:

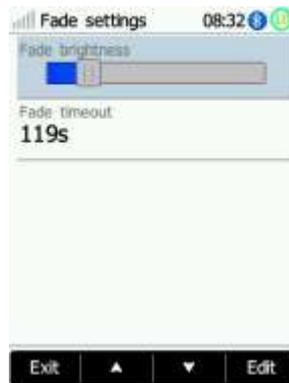


- **Automatic brightness control** more details are under hamburger menu



- **Minimum brightness**
- **Maximum brightness**
- **Get brighter in** is Time to reach max brightness
- **Get darker in** is Time to reach min brightness
- **Brightness at USB power** will set the level of backlight, when USB power is present
- **Brightness on battery** will set the level of backlight, when USB power is not present

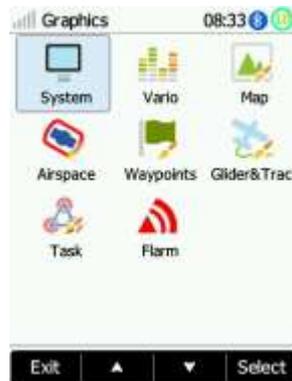
- **Screen fade** enables fading screen to level "**Fade brightness**" after "**Fade Timeout**" time



- **Fade brightness** is level of brightness, the screen will fade
 - **Fade timeout** is time, the screen will fade to "fade brightness"
- **Auto lock screen**
 - **Auto lock timeout** Is a time, after screen will lock
- **Wake screen on events** enables turning on the screen, even if the screen is off
- **Led brightness** can be adjusted in this menu

5.8.4 Graphics

Graphics has many sub items which are related to **System, Vario, Map, Airspace, Waypoints, Glider& Track, Task, Flarm** customization.



5.8.4.1 System

In system submenu, user can switch between **light** and **dark** theme and adjust colors for navboxes and banners.



5.8.4.2 Vario

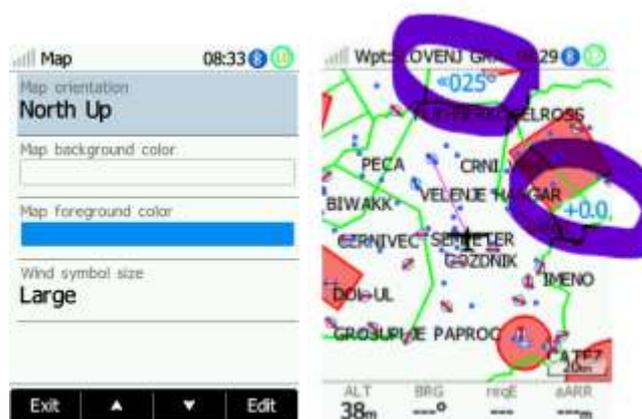
Vario tape can be displayed or hidden. The background color can be chosen between light and dark style. The scale color can be set also for positive as well for negative readings of vario.



5.8.4.3 Map

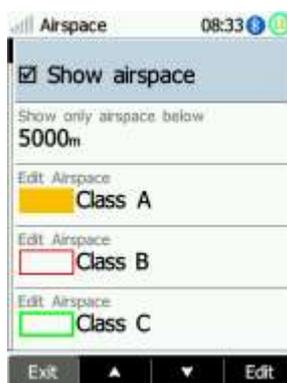
Map orientation, background **color** and **wind symbol** can be set in that menu.

Map foreground color defines color of MC text and steering course on the map screen.



5.8.4.4 Airspace

Displaying of airspace and colors for each type and class of the zone can be set here.



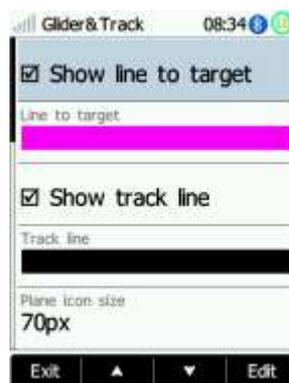
5.8.4.5 Waypoints

Displaying of waypoints and their names can be set here.



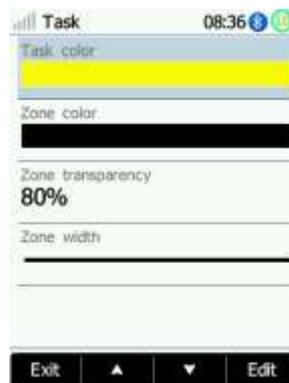
5.8.4.6 Glider & Track

Displaying of glider and it's track can be set here.



5.8.4.7 Task

Colors of task elements, can be adjusted in this menu.



5.8.4.8 Flarm

Colors of flarm objects, can be adjusted in this menu.

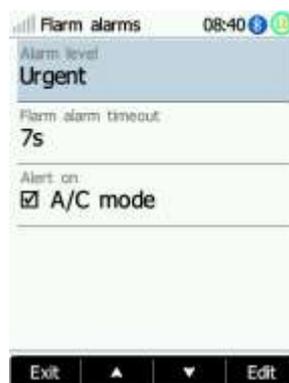


5.8.5 Warnings



Altitude warnings, Flarm warnings and their conditions can be setup under this menu. The Flarm warnings are classified into three levels (See Flarm manual for details on www.flarm.com)

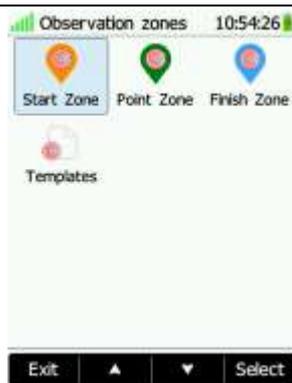
- First level (Low) approximately 18 seconds before predicted collision
- Second level (Important) approximately 13 seconds before predicted collision
- Third level (Urgent) approximately 8 seconds before predicted collision.



Flarm timeout defines time, where user will not get flarm warning after dismissing flarm warning of particular flarm object.

5.8.6 Obs. Zones

This menu defines the default observation zone geometry. The following items can be chosen: start zone, turn point zone and finish zone.



Each type of observation zone is defined with two angles, two radii and mean bearing (**Angle12**). These parameters enable the creation of any known zone geometry separately for start, turn point and finish.



Using parameters in the zone dialogue it is possible to describe all types of observation zones.

Angle12 defines the orientation of the observation zone. Available values for **Direction** are:

- **Symmetric:** This is the most common selection for turn point.
- **Fixed:** This is mostly used for assigned areas.
- **Next:** will orient the observation zone in direction of the outgoing leg. This is usually used for start.
- **Prev:** will orient the zone in direction of the incoming leg and is usually used for the finish.
- **Start:** orientates the sector always towards the start.

If the **Line** checkbox is checked the sector will become a line type of observation zone. The **Radius 1** parameter describes half of width of line length. Use the UP/DOWN arrow buttons to increase or decrease radius for step 0.1. Long press will increase/decrease for 5.0.

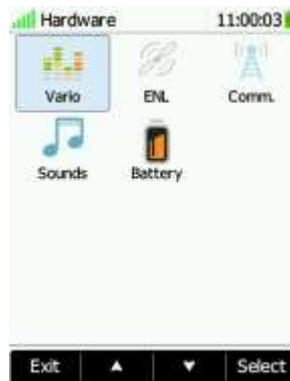
If **Line** is not checked the **Angle1** parameter will define the basic shape of the observation zone. A value of 180° means that the zone is a cylinder and 45° is the classical FAI sector.

Use Up/Down buttons to select right angle.

Angle2 and **Radius2** are used for more complex observation zone setups.

When changing observation zone parameters the screen is automatically updated to display the new zone.

5.8.7 Hardware



In the Hardware menu there are five sub items:

- Vario
- Enl
- Communication
- Sounds
- Battery

5.8.7.1 Vario



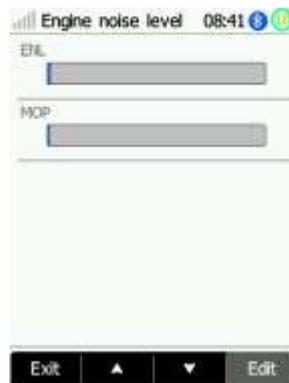
Vario submenu allows you to adjust the **Vario filters** for the **Vario needle** and the **vario sound**, the time constant for **average vario** and vario tape **range**. Higher number at vario filters means more damped vario signal.

5.8.7.2 Communication



In the communication menu, you can enable or disable the **Bluetooth** device, enable or disable **NMEA output** on the USB port, **baudrate** for external serial interface. Communication enables you to set the way NANO⁴ will communicate with the Flarm. With Target data NMEA you can enable NMEA data transmission (GPRMB and LXVTARG) to other external GPS devices (Oudie, PDA's, Smart phones,..). Target data source enables the NANO⁴ to communicate all information about the current target, depending on which page you are (Task or Waypoint). AUTO option automatically detects the page mode (whether you are in Task or Waypoint page) and send information about your current target.

5.8.7.3 ENL



This page is just for monitoring the engine noise level ENL. MOP (means of propulsion) is provided to detect noises produced from JET engines.



How to use Nano⁴ as MOP recorder, please read IGC approval for Nano⁴.

5.8.7.4 Battery health

User can see Voltage of the battery, the voltage is typically between 3,5V and 4,2V. Current depends on power consumption (LCD brightness, BT, Wifi) and voltage of battery. Health can be described as

- Excellent
- Good
- Bad
- Contact service (That may indicate end of life of the battery).



5.8.7.5 Sounds

In this menu various setting for sounds can be adjusted. **Volume** of vario sound, enabling of **system sounds** and enabling of **vario sounds**. From version 1.5 here is also sound setting for Flarm warning.



Vario volume can also be adjusted using side buttons, but only in GPS info page.

5.8.8 Flarm

If a flarm is detected, the user can make some configuration setting changes on the flarm and get some flarm status information .



5.8.9 Files



Airspace and **waypoints** files can be selected here. The NANO⁴ supports **CUP** file format for waypoints and **CUB** file format for airspace. There is no limitation in file size or number of

waypoints, but reducing the size of the airspace area or number of waypoints, performance of the NANO⁴ will be better.

In the same section you can convert all IGC files loaded on the NANO⁴ to KML file format. FlarmNet data can be loaded also in this section and is useful only if flarm is connected to NANO⁴



Waypoint CUP file is limited to maximum 1Mbyte size
 Airspace CUB file is limited to maximum 5Mbytes size
 Flarm net FLN file is limited to maximum 5Mbytes size

5.8.10 Units



In this menu can be set the units for speeds, distances, altitudes...

5.8.11 Logbook

All flights recorded by the NANO⁴ are stored and sorted by date here. The user can find date, take-off and landing time and duration of the flight. Use the two middle buttons to navigate through the list. Long press of these buttons will get you faster to the first or last flight recorded.

Date	Time	Duration
24.01.2017	T: 14:09 L: 14:28	00:19:34
24.01.2017	T: 10:46 L: 11:13	00:26:37
06.01.2017	T: 15:34 L: 15:44	00:10:03
06.01.2017	T: 15:15 L: 15:36	00:20:10
06.01.2017	T: 14:23 L: 14:31	00:07:43

5.8.12 Polar & Glider

The Polar and Glider section allows you to load and edit a set of parameters for your glider's polar. You can select from a pre-defined list of nearly every common glider or make your own polar.

Select a Glider from the List: presents you with an alphabetical list of all the common gliders and associated polar data. All glider data will be copied from the chosen polar.



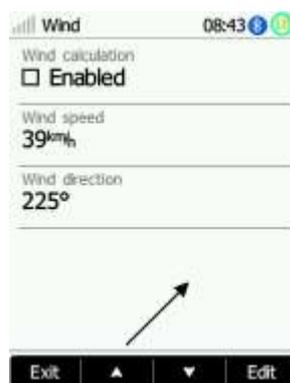
You can modify the polar by changing coefficients **a**, **b** and **c**. A polar is defined as a quadratic equation with the parameters a, b, and c.

Use the SeeYou program (Tools->Polar) to calculate coefficients a, b and c for a given glider's polar. The program requires three sink points entered at selected speeds (e.g.: 100 km/h, 130 km/h, and 150 km/h). The program will calculate the values of a, b and c, which should be noted and entered into the NANO⁴.

- **Class:** Options for Touring, Ultralight, World, Twin-seater, Club, 18-meter, 15-meter, Open, Standard and Unknown are available.
- **A, b, c:** Options can be adjusted or entered for a non-listed glider.
- **Reference load** (wing loading) value represents the value at which the polar was measured.
- **Reference weight** corresponds to the weight value at which the polar was measured.
- **Maximum takeoff weight** is the maximum take-off weight allowed for the glider. It is not used in the calculation; it is just a reminder to the pilot of the maximum take-off weight. **Empty weight** is weight of the glider without the pilot and ballast.
- **Pilot weight** is the weight of the pilot with parachute and baggage.
- **Co Pilot Weight** is the weight of the co-pilot with parachute and baggage.

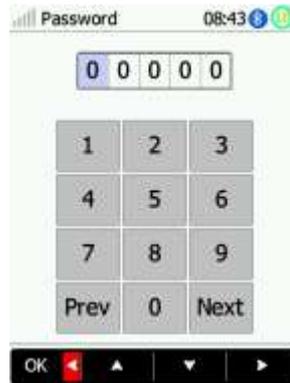
5.8.13 Wind

In this section the user can define wind calculation method. Select **Manual** to adjust manually wind speed and wind course. In **automatic** mode, this will be done automatically by the NANO⁴ based on GPS data.



The pilot can enter manually wind with sliding on the lower part of the screen (arrow).

5.8.14 Password



Following passwords are available for users:

- 00666 - Reset all settings to factory default
- 00667 - Reset battery calibration to factory default (Battery will need new calibration cycle, to be calibrated).
- 32233 - Format internal flash memory (All data will be lost)
- 11111 - Prepare battery for storage (discharge to 50%)

5.8.15 About



Under about menu, user can see the version and serial number of the NANO⁴

5.8.16 Shutdown



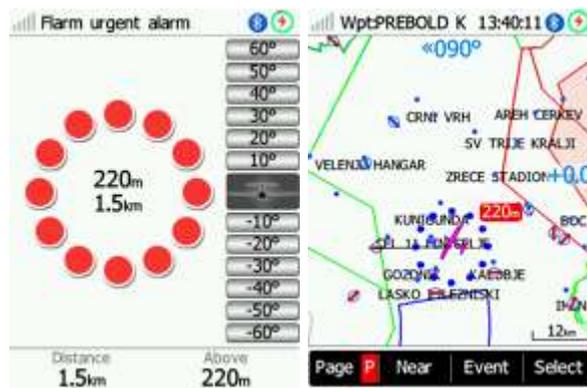
Pressing the button adjacent to this item on the NANO⁴ screen will shut down the NANO⁴ after confirmation.

6 Flarm on NANO⁴

NANO⁴ is able to display flarm and PCAS traffic on map or on radar screen. Radar screen is visible only when Flarm is detected by NANO⁴. In case of collision warning, another screen will be displayed, which will inform us, from which direction the threat is coming from.

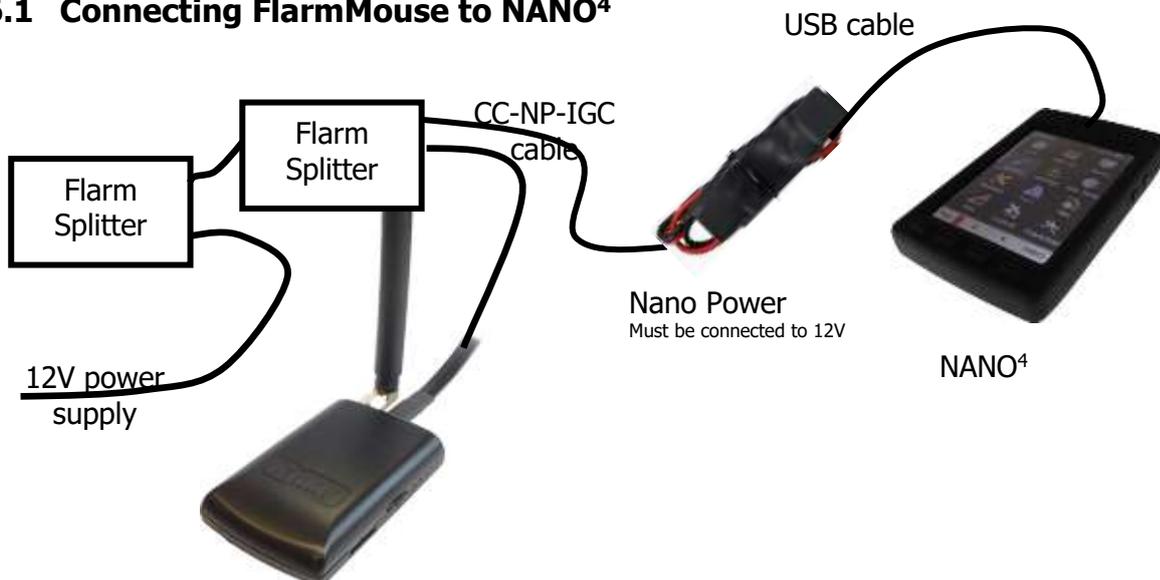


PCAS alerts on the map are represented as a dotted circle with relative altitude, the PCAS warning is represented as lights on the clock as red or orange.

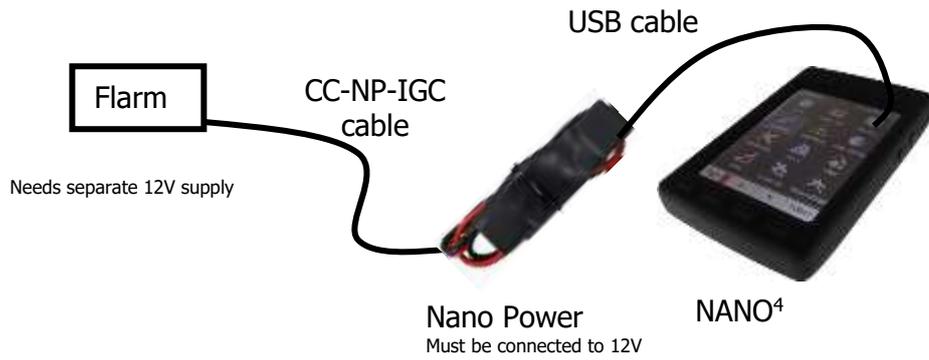


Flarm warning can be dismissed with a short press of any button. Dismiss time can be configured in setup.

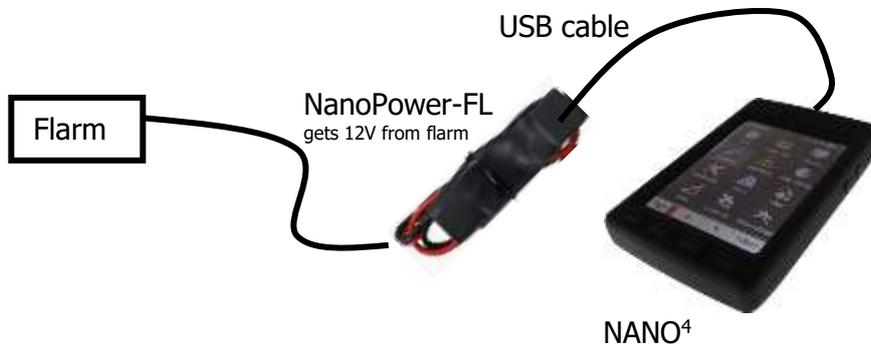
6.1 Connecting FlarmMouse to NANO⁴



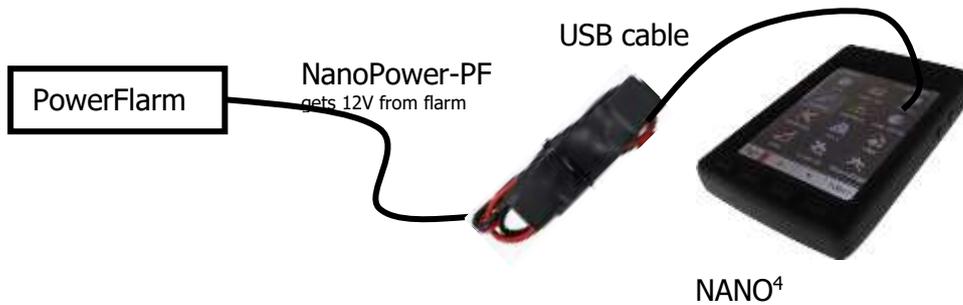
6.2 Connecting Flarm to NANO⁴



6.3 Connecting Flarm to NANO⁴ using NanoPower-FL



6.4 Connecting Flarm to NANO⁴ using NanoPower-PF



7 Configure NANO⁴

Flight declarations can be uploaded to the NANO⁴ in four different ways:

- Directly on the NANO⁴
- Using the NanoConfig program on PC,
- Bluetooth (NanoConfig for Android, Oudie, XCSoar,..)
- Serial interface (PDAs, Oudie, XCSoar)

Declarations are stored in the SYSTEM folder in a file called **decl**. The declaration file is formatted as a standard IGC header file. It is recommended that you do not try to modify this file yourself.

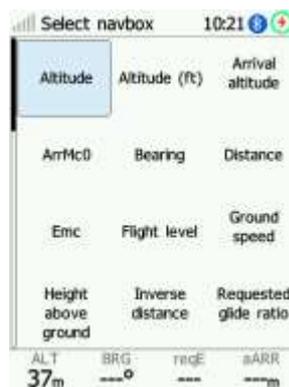
7.1 Directly On NANO⁴

7.1.1 Pilot information

Detailed information is written in Ch.5.8.1

7.1.2 Editing Nav boxes

At the bottom of the map screen are four nav boxes, which can be chosen by user. With long press on nav box, user can select by many nav box options.



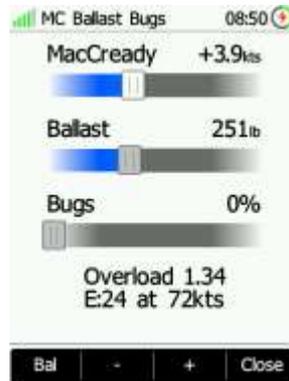
Following nav boxes are available:

- Altitude
- Altitude in opposite unit (m<->ft)
- Arrival Altitude
- Arrival Altitude at Mc = 0 setting
- Bearing
- Distance
- Calculated final glide at chosen Mc
- Flight level
- Ground speed
- Height above ground
- Distance in opposite units (km<->nm)
- Required glide ratio to reach target at chosen Mc
- Required altitude to reach target at chosen Mc
- Task distance
- Task required glide ratio to reach task finish at chosen Mc
- Thermal vario
- Track
- Wind

- Wind component

7.1.3 Setting MC

With touching to Mc value, user can access to the following screen.



On this screen Mc, Ballast and bugs can be adjusted. At same time calculated final glide and speed is displayed on lower part of the screen.

7.1.4 Declaration and editing of a task

In the Task page, the user can enter or edit the task, which will then be automatically declared when you leave this page. Waypoints can be loaded into a task from the active waypoint file.



A Task can be entered in a very simple way. In the task page you can press the **edit** button. Using the up or down button you can highlight an existing waypoint or empty space and then set a new waypoint. By pressing the **Ins.** (insert) button you can start browsing through all of the waypoints in the selected CUP file.

Selecting from a list of waypoints is very intuitive. The NANO⁴ will only offer you a choice of characters that are available from the list of waypoint names available. Using the button >> you can move to the next character (right), the red part of the label **B** indicates one space back or one character to the left using a longer press of the button. A similar function is used for the **OK** button, where you can confirm a selected waypoint or with the **C**, you can cancel the selection of a waypoint. The previous waypoint will then be selected.



When you are back in the Task menu, you can **Insert** or **delete D** waypoint.



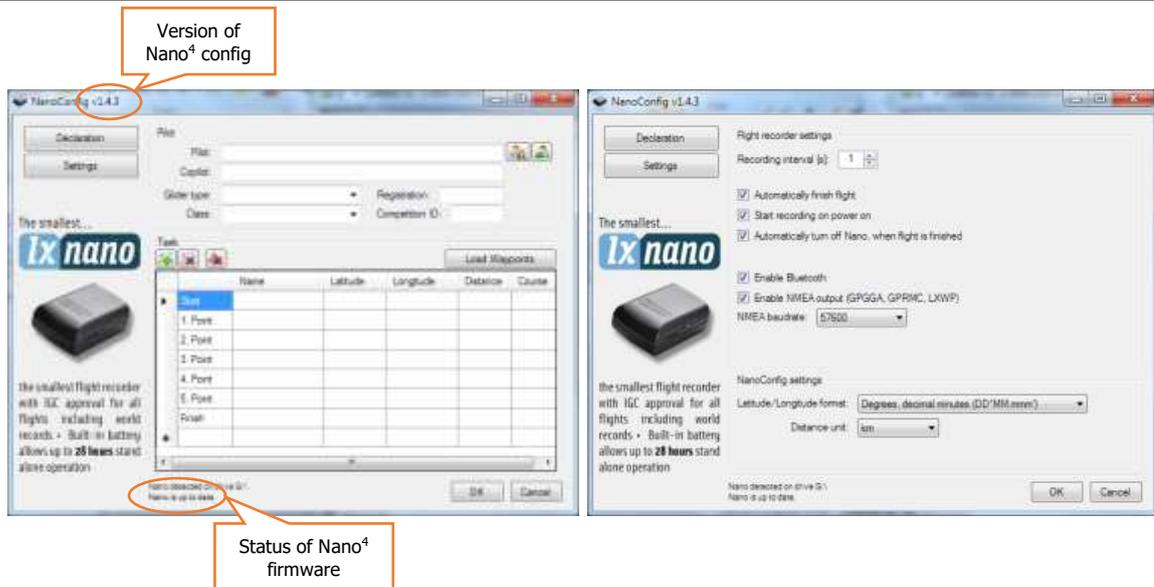
To *insert* a waypoint you make a quick press on the **Ins.** and to *delete* a waypoint you press and hold down **D** for about (not more than) a second

Each waypoint can have a custom zone or area applied. These areas can be modified by pressing to Zone button.



7.2 On a PC with NanoConfig for Windows

Use the NanoConfig program to configure the NANO⁴. A flight declaration can be uploaded or various parameters can be modified using this program. The NanoConfig program consists of two major screens. A flight declaration screen and a settings screen.



You may toggle between these two screens by pressing the **Declaration** or **Settings** button in the upper left corner of the NanoConfig program. Press the **OK** button to confirm changes and exit from the program. Press **Cancel** to abandon changes and exit without saving data.



It is important to run the NanoConfig program directly from the NANO⁴. Do not copy the NanoConfig program to another location as the settings and declarations will not be written properly to the NANO⁴.

The version of the program is written in the lower left corner of the NanoConfig window. When requesting support from LXNAV or reporting a bug, please always include the version of the program in your email.



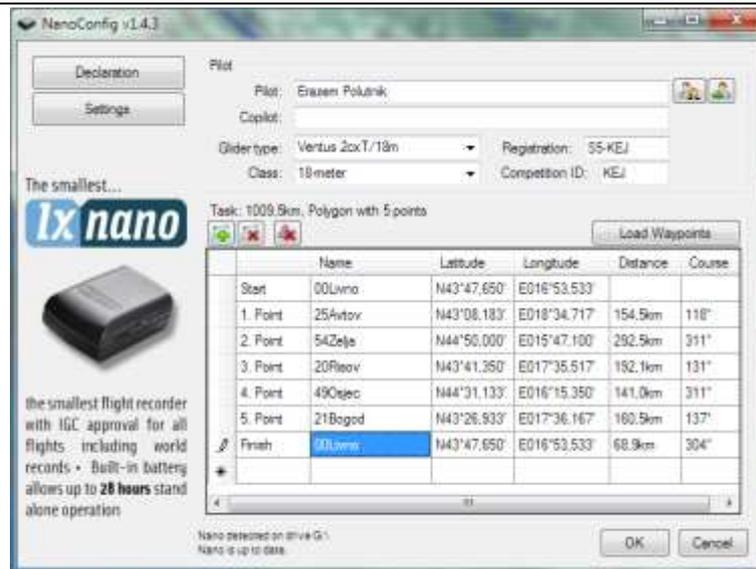
All NANO⁴ configuration variables are stored in the SYSTEM folder of the NANO⁴ in a file named "system.ini". It is strongly recommended that you do not modify this file yourself. If you need more information about the "system.ini" file please contact us.



NanoConfig for OSX is also available. For more info please contact info@lxnav.com

7.2.1 Using the Nanoconfig program

Run the NanoConfig program and go to the declaration screen. The declaration screen is split into two groups. Pilot and glider related information is in the top group and the task declaration is shown in the bottom group.



7.2.1.1 Pilot information

Enter pilot and glider information in the pilot section. In the top right you will find two icons. The first icon will show a list of stored pilot information and the second will add the current pilot information to the list.

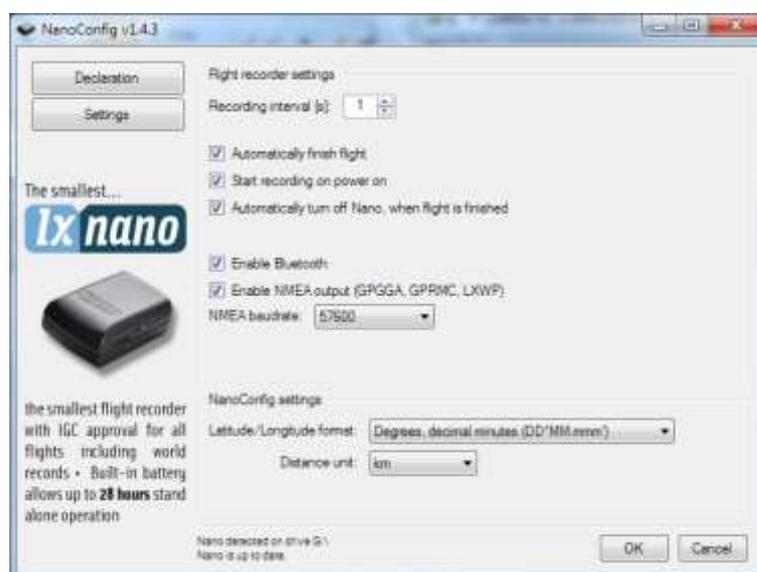
Pilot	Copilot	Glider type	Registration	Class	Competition ID
Erzen Polunik		LSB-10	55-3118	Standard	EU
Maja Špica		EB 28	55-490M	Open	MS
Uroš Klavžič		HPH-304	55-JET	18meter	LK

7.2.1.2 Task declaration

Before creating a task you have to load the waypoints from which the task will be created. Press the **Load Waypoints** button to load waypoints. Waypoints can be loaded from a CUP formatted file. Once waypoints are loaded you can create a task by typing the names of the waypoints. Use the icons in the upper left corner of the task declaration group to add or delete a point or to clear the whole task. Task points can also be deleted by pressing the DEL key or can be inserted by pressing the INS key.

7.2.2 Changing parameters with NanoConfig

Run the NanoConfig program and go to the settings screen. The settings screen is split into two sections. Settings dedicated to the NANO⁴ and settings for NanoConfig.



Parameters for the NANO⁴ include recording interval, NMEA output and Bluetooth enable settings.

In NanoConfig you can change the distance units used in the task declaration and the format of latitude and longitude.

7.2.2.1 Flight recording interval

The flight recording interval is set to one second by default. It is recommended that you keep this setting. Even with the recording interval set to one second, the NANO⁴ is capable of storing approximately 28000hours of flight. Having a recording interval of one second will allow you to do more accurate post-flight analysis and increases the probability of obtaining a data point in the observation zone.

If you wish to change these settings, use the up/down arrow or type a new value.

7.2.2.2 Automatically finish flight

If this option is enabled, the flight will be automatically finished and digitally signed once conditions for finishing the flight are met. The NANO⁴ must fulfil the following conditions for 30 seconds. GPS status is ok, ground speed is below 4m/s, vertical speed is within 0.2m/s and altitude is below 3000m.

7.2.2.3 Start recording on power on

If this option is enabled, recording of a new flight will be automatically started when the NANO⁴ is powered on. If this option is disabled the NANO⁴ will start recording when vertical speed is above 1m/s and the ground speed is above 8m/s. This option is most useful for paragliders.



When this option is enabled, option Automatically finish flight is ignored.

7.2.2.4 Automatically turn off Nano, when flight is finished

This option is very useful for NANO⁴ when installed more or less permanently into the glider. If this option is enabled, the NANO⁴ will automatically switch off 30 minutes after the flight is finished.

7.2.2.5 Bluetooth

Check the **Enable Bluetooth** checkbox if you want to turn it on. By default Bluetooth is disabled.



When Bluetooth is enabled, the NANO⁴ will consume more power and the total endurance of a new and charged battery will reduce approximately to 14 hours.

7.2.2.6 NMEA output

Check **Enable NMEA output** to output NMEA data. The NANO⁴ will transmit the following NMEA sentences GPGGA; GPRMC, LXWP0 every second and LXWP1 once per minute. NMEA can be output to either the serial interface or Bluetooth but not to both simultaneously. Change the NMEA **baud rate**, if you want to output NMEA at different baud rates.

7.3 Using Bluetooth or serial interface

Flight declarations can also be uploaded using the serial interface or Bluetooth (See chapter 7.4.1 for Bluetooth pairing). The NANO⁴ must be running in normal operating mode.



When connecting through the serial interface, you should use the same baud rate as is set for NMEA output on the NANO⁴.

When connected through Bluetooth baud rates are not important.

Please refer to the manual for the software used to upload flight declarations. (E.g. SeeYou Mobile)

7.4 NANO⁴ config for Android devices

NanoConfig can be downloaded from LXNAV web site or Google Play Market. The NanoConfig is a configuration tool for the NANO⁴. The user can easily modify flight recorder parameters,

edit pilot and glider information, edit the declaration, and transfer flights from the NANO⁴ to a smart phone.



NanoConfig consists of five tabs: Main, Logbook, Pilot, Task and Settings.

7.4.1 Connecting and pairing the NANO⁴

When you run the NanoConfig on a smart phone, the program will first ask you to turn on Bluetooth, if it's not turned on already.

Over the menu button is access to the scan function, which will scan for Bluetooth devices. If the NANO⁴ is turned on and Bluetooth functionality in the NANO⁴ is enabled, it will appear on the scanned list. Choose Nano. The first time it will be necessary to pair the NANO⁴ and the Smart Phone together. Read more about pairing in Ch.4.9.

7.4.2 Main page

On the main tab, information about the NANO⁴ and its GPS status are shown.

7.4.3 Downloading flights

The first time you access this tab, NanoConfig will automatically start reading flights from the connected NANO⁴. Downloading always starts from the most recent to the oldest flight. If you have a lot of flights in the NANO⁴'s memory, the transfer of the logbook can be interrupted with the BACK button.

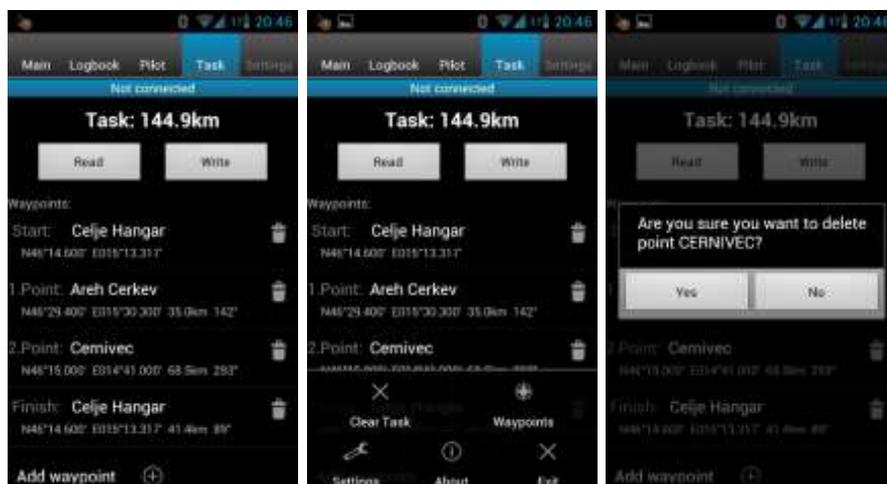


After downloading of the logbook data is finished, a short press on the desired flight will start the download process. If the flight size is big, the download may take more than minute. Flights are downloaded into the NanoConfig folder. With a long press on the flight, the downloaded flight can be shared with other applications installed on your smart phone (Gmail, SeeYou, OLC (not available) , Google Docs, Facebook).

7.4.4 Editing pilot info

The Pilot tab can be used to edit information about the glider and crew.

7.4.5 Editing task for declaration



Editing the task is very simple. First is necessary to choose a waypoint file in the CUP (SeeYou) format. To select the CUP file, use the MENU button. On some devices you must press for a long time to menu button $\bar{=}$. Press the Add waypoint button to add the waypoint to the last position. A long press on the waypoint will give us an option to insert a waypoint. On the right hand side of waypoint name is the trash box. Press the trash box to delete the waypoint from the list. After a task has been entered, it can be transferred to the NANO³ by pressing the Write button.

7.4.6 Configuring NANO⁴

In this tab the recording interval, automatic power off, and NMEA settings can be configured.

8 Troubleshooting

Q: My computer does not recognize the NANO⁴ as a USB mass storage device?

A: Make sure that the NANO⁴ is turned off before connecting to the computer.

Q: Is the internal LiIon battery for the NANO⁴ end-user replaceable or would I need to send the unit back to LXNAV or a dealer to have the battery replaced?

A: User cannot replace the Li-Ion Battery. See chapter 4.11

Q: I can't read the NANO⁴ on my notebook.

A: Change power management scheme on your notebook, or connect notebook to power supply.

Q: When I connect the NANO⁴ to my notebook, message "USB device connected" would appear, disappear, appear, etc. from the laptop screen.

A: Change power management scheme on your notebook, or connect notebook to power supply.

Q: Can I open files from the NANO⁴ on the Apple computer?

A: Yes.

Q: I run Ubuntu on my laptop so cannot run NanoConfig.exe.

A: NanoConfig is Windows application, that runs only on windows operating system.

Q: Can I declare task with an OUDIE?

A: Yes, declaration can be done via serial cable or over BlueTooth. Please read step by step instructions

http://www.lxnav.com/downloads/manuals/FAQ_Upload_declaration_from_OUDIE%20to%20NANO.pdf

Q: When I run nanoConfig, I'm getting errors.

A: Probably Microsoft Net Framework is not installed.

9 Revision History

January 2017	Initial release of owner manual