User manual AltiSAN v4.1 E-INK GPS

SW version: 1.5

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| Software revisions | |
|--------------------|------------------------------------------------------------------------------|
| 1.2 | First public release |
| 1.3 | Added second QNH |
| 1.4 | Added the ability to set AMSL automatically according to GPS when turned on. |
| | Display GPS altitude when setting AMSL (QNH). |
| | It is possible to set altitude directly in meters or feet AMSL, not via QNH. |
| 1.5 | Bluetooth communication converted to BLE for compatibility with XCTrack |
| | 9.11.x and above. |
| | Possibility to set the format of data transmitted via BLE. |
| | Display of Bluetooth icon in front of battery indicator. |
| | Modified environment for firmware update. |
| | Fixed redrawing error of some menus. |



Description and parameters

Size: cca 76x56x34mm Weight: cca 96g Display: E-INK 1,5" s rozlišením 200x200bodů. Board: Proprietary with ESP32 module and integrated charging Baro senzor: Bosch BMP280 GPS modul: ATGM336H-5N with ceramic antenna Wi-Fi a BlueTooth: 802.11BGN, BT 4.0 Battery: Li-ion 18500 1900mAh Box: depending on the variant PLA or PETG material and 3D printing, bottom side Velcro Operating temperature: Recommended 0-40°C. Display in operation 0-50°C (switched off -25°C~70°C). Technically it is possible to use the device below 0°C, but the battery life is significantly reduced, but most importantly this type of display does not like cold and will redraw much slower. *Do not leave the device in the sun, for example, in a car!* Temperatures over 50°C can deform the PLA box. The PETG version of the box is resistant to approx. 65°C. Units: Altitude: in meters or feet

speed: in kilometers (km/h), knots (kt), miles (mph)





Height measurement

The height calculation is based on the measured barometric pressure from the Bosch BMP280 sensor. Furthermore, on the entered converted pressure at sea level QNH and temperature. The measurement is continuous, but is evaluated 2-6 times per second. According to the manufacturer, the theoretical accuracy of the measured pressure is ± 0.12 hPa, i.e. ± 1 m at a temperature of 25°C. The accuracy is affected by temperature, but also, for example, by gusty winds. For our needs, the device displays the height only in whole meters or feet. The height is more accurate when displayed in feet. There, "unnecessary sensitivity" is already manifested and the height tends to "float". The AMSL height can be taken from the GPS and then adjusted or entered in units of height or QNH. QNH can be entered with an accuracy of 0.25hPA.

E-INK display

This type of display, sometimes referred to as electronic ink, can be found, for example, in electronic book readers such as Kindle. Their main advantage is perfect readability in good lighting conditions and minimal energy consumption. The disadvantage is that they are not extra fast when changing the image (temperature also has a significant effect) and when redrawing, it can happen that the original image is still partially visible. Within a few seconds, this "ghost" disappears or it is necessary to do a complete redraw, i.e. fill the entire image with black and then white, and ideally several times in a row. I decided not to use full redrawing because it is time-consuming and the "ghost" usually disappears quickly.



Example of E-INK "ghosting". The Vario up arrow is the previous state.

Another unpleasant feature of this type of display is that after switching off, various fragments of the last display remain on the display. It is a feature, and I currently cannot do anything about it. The switching off is fully mechanical and I would have to convert it to a software one. Maybe in time.

GPS positions

The device is equipped with a module that receives signals from the GPS, GLONAS and Beidou satellite systems. Based on the availability of the given satellites, it calculates the position. The accuracy of the position is determined by the number of available (visible) satellites and reaches a value of 2.5m at full focus. The fixation (focusing) speed is approximately 30-60 seconds in open terrain. For minimum position fixing, at least three satellites are required. For optimal operation, at least six satellites. The GPS module cannot be turned off.

If the question mark "?" is displayed on the top line before the battery percentage, this indicates that the position has not yet been fixed. It is practically impossible to capture the signal inside a building and very poorly near windows. The device does not have as high sensitivity as high-end mobile phones and needs to "be outside" where it works without problems. The first indication that there is at least partial reception of the GPS signal is that the time in UTC appears and then the date. Then the coordinates of the current location should appear. The unknown position indication disappears. The signal reception antenna is located to the right of the display. Do not cover this part of the device, otherwise GPS reception will be impaired.

Changing units

In the setup menu it is possible to enable/disable the behavior where a long press of the blue button on most screens will cause a change of the primary altitude units. Altitude and speed units are linked. Some screens allow dual display of values. You can use this when communicating with air traffic, for example, where tracks are primarily used for altitude units, but it is easier for us to navigate in meters.

| Set height units The speed will be displayed in | |
|-------------------------------------------------|------------------------|
| m – meters | km/h – kilometers/hour |
| ft faat's | kt/h – knots/hour or |
| it – leet s | mps – miles per hour |

You can set the speed units to be used when the altitude is in feet in the Setup menu. Altitude is meters are always linked to km/h.



Some screens display an "arrow" vario. The value is updated every 500 milliseconds. Ascent or descent is indicated by an arrow that has three sizes up and down. When the altitude changes by at least 0.3m/s (or 1ft/s), an arrow appears and the ascent/descent rate is displayed. The last state, i.e. ascent/descent, is then indicated for 0.5 seconds by an arrow without a number.

Indication levels

| Arrow size | m/s | ft/s |
|------------|-------|------|
| 1 | >0,3 | >1 |
| 2 | > 1 | >3 |
| 3 | > 1,5 | >5 |

The maximum display range is limited to 10m/s or 30ft/s. The data in feet is displayed without a decimal point. *The indication level or limits cannot currently be adjusted.*

Bluetooth a Wi-Fi communicate

The device has an integrated Wi-Fi and BT module, which can communicate with, for example, a mobile phone and the XCtrack application. Turning on BT affects the device's battery life. The device consumes the most power when BT communication is active. The power consumption is about 1/5 higher than when BT is turned off.

From version 1.5 onwards, it can only be used if your mobile phone supports Bluetooth LE (BLE) communication.

If you have such an old phone that it doesn't support BLE, download and use Firmware 1.4 and XCTrack version 9.10.5!

For XCTrack from version 9.11.x, it is necessary to use firmware 1.5 and higher. I found that on most new phones, otherwise XCTrack will not receive data from AltiSAN. But there are phones that can. We cannot ensure full compatibility with the XCTrack developers, so I had to change the communication protocol.

Wi-Fi communication is disabled by default and is only used for OTA firmware updates. The device cannot transmit data via Wi-Fi.

Power ON – OFF

A mechanical slide switch on the front is used to turn the device on and off.

Position: LEFT – OFF, RIGHT – ON. Within 2 seconds after switching on, the display lights up, the blue LED flashes and the introductory text appears.



Attention: if the device's battery is discharged below a critical value, the device will be turned off by the protective circuit, but the switch remains in the on position. The device must be recharged as soon as possible! In case of long-term non-use (more than 3 months), it is necessary to keep the device charged to approximately 50% to preserve the battery life. I.e. ideally after 3 months, turn on the device and check the battery status and recharge it if necessary.

If the device cannot be turned on: Connect the USB charger. Switch the power switch to the ON position. The device will turn on after connection and you can see the charge percentage in the upper right corner. CAUTION: When the power switch is turned off with the charger connected, the device will continue to work, but will NOT charge the battery. The percentages shown are not relevant!



Power-on status. The battery status is displayed in the upper right corner.

Use short presses of the red and blue buttons to adjust the QNH value to a known condition or known takeoff altitude. Finish the setup by holding down the red button. The device can then be used.

Control

To move between the individual screens, use the buttons below the display. Left short press (red) moves "left", right short press (blue) moves "right" see schematic display of the screen order. The buttons distinguish two states: "Short press" i.e. approx. 0.5 seconds and "Long press", when the button is held for at least 1.5 seconds. In general, it can be said that a long press of the red button is used to reset values or enter settings, and a long press of the blue button on most screens changes the displayed units m>ft>m (this function can be turned off in Setup).



Schematic sequence of firmware 1.5 screens:

You set what is displayed on the "Graph" screens by long pressing the red button.

Screen: Setup QNH



Setting AMSL by directly

entering altitude

| Button functions | |
|------------------|--------------------------------------------------------------|
| Red short press | Decrease QNH value by 0.25 OR decrease altitude by set value |
| Blue short press | Increase QNH value by 0.25 OR increase altitude by set value |
| Red long press | Exiting QNH setting mode |
| Blue long press | Switching between QNH and regional QNH settings |

- Default display after starting the device.
- Display of QNH, AMSL (pressure derived) and GPS A which is the GPS altitude. If the GPS position is not focused, it shows zero. It is used to compare the entered values.
- An asterisk is displayed for the value you are setting (QNH or altitude). This can be switched in the setup menu.
- The value can be changed by briefly pressing the buttons.
- To end the editing and SAVE, press and hold the red button. The values are written to the memory and are retained for the next time the device is turned on.
- The upper AMSL reading is in primary units.
- Long-pressing the blue button switches between setting the primary QNH and regional QNH. In short, it is possible to set two QNHs and switch between them on the fly.
- Before flying, always adjust the QNH to the current pressure or to the known altitude of the launch pad. Without this adjustment, the displayed AMSL altitude data is not relevant!

Screen: QNH & Pressure



RED long to modify

| Button functions | |
|------------------|-------------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Entering QNH setting mode |
| Blue long press | Switching between QNH and regional QNH settings |

- Display of QNH value, AMSL altitude (m or ft) and "Press" pressure in hPa.
- Long press the red button to switch to setting mode.
- Long press the blue button to switch between setting primary QNH and regional QNH. In short, it is possible to set two QNH and switch between them during the flight.

Screen: Graph Vario







AMSL / Vario / Speed

AMSL / Vario / QFE

AMSL / Vario / Stopwatch

| Button functions | |
|------------------|---------------------------------------------------------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Change view AMSL/Graph vario/Speed AMSL/Graph vario/QFE AMSL/Graph vario/Stopwatch |
| Blue long press | Change units (if enabled in the setup menu) |

- The arrow vario is displayed in the left part.
- Behind the dividing vertical line, the vario progress for the last 85 seconds.
- The horizontal dividing line in the vario graph represents zero ascent/descent.
- The graph moves to the right, i.e. the current value is to the left behind the dividing line.
- The graph is progressive. By default, values of +-3m/s can be accommodated. For larger values, the Y axis is reduced by half.
- The dividing vertical line shows the max/min values that the graph contains.
- The numerical value above the line is the AMSL height in primary units.
- The numerical value below the line can be speed, QFE, stopwatch. To switch the display, hold down the red button for a long time. The selected setting is saved in memory and will be used the next time it is turned on.
- The height is rounded to an integer.
- Long pressing the blue button will change the units (if enabled in the setup menu). The max, min and start altitude values will remain and will only be recalculated.

Screen: Graph Alt



AMSL / Alt chart / Speed



AMSL / Alt chart / QFE



AMSL / Alt chart / Stopwatch

| Button functions | |
|------------------|---------------------------------------------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Change view AMSL / Alt / Speed AMSL / Alt / QFE AMSL / Alt / Stopwatch |
| Blue long press | Change units (if enabled in the setup menu) |

- The left part shows the arrow vario.
- Behind the dividing vertical line is the course of the AMSL altitude history for the last 170 seconds.
- The graph moves to the right, i.e. the current value is to the left behind the dividing line.
- The altitude graph is progressive. If the min/max difference in the altitude history is larger, the resolution is dynamically reduced.
- The dividing vertical line shows the max/min values that the graph contains.
- The numerical value above the line is the AMSL altitude in primary units.
- The numerical value below the line can be speed, QFE, stopwatch. To switch the display, hold down the red button for a long time. The selected setting is saved in memory and will be used the next time you turn it on.
- The altitude is rounded to an integer.
- Holding down the blue button for a long time changes the units (if enabled in the setup menu). The max, min and start altitude values are retained and are just recalculated.

Screen: GPS

GPS status menu items:

HDOP: in the GPS menu shows the position measurement error. If it is larger than 25m, the position cannot be targeted.

Alt GPS: is the calculated GPS altitude. It has no effect on the baro altitude and is not actively worked with!

Speed: is the current speed. Especially in poor signal or shadowing, e.g. in a building, the speed of movement may appear even when you are not actively moving.

The compass and takeoff heading are only displayed when you are flying!

Without GPS position **Question mark displayed**



Fixation GPS signal starts to be acquired Position fixed. **Question mark disappeared** Time (UTC) and date set



72 status C:12:35:36 te:05/22/2023



- This status screen is displayed when you are not flying.
- In-flight status



333m - Baro Altitude AMSL **10km** - Distance from start 15min - Time to start point 42km/h - Current speed **Compass** - The target is approximately 45 degrees left back from the direction of flight. Compass N - North is approximately 0 degrees, i.e. we are flying north.

- Arrow vario on the left.
- If you are flying, you can switch from the navigation screen to the Status screen by long-pressing the red button and back again.

- You cannot switch to the navigation screen if you are not flying.
- When you stop the stopwatch, the screen switches from navigation mode to status mode.

• ATTENTION The device does not have a digital compass, so the north (N) position is valid only when the device is in continuous motion (flight). The advantage is that it does not depend on the orientation of the device on the stand or straps.

• If you stop or stand, the direction to north or the home arrow will not point correctly.

| Button functions | |
|------------------|-----------------------------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Change navigation > status > navigation screen. Only in flight. |
| Blue long press | Change units (if enabled in the setup menu) |

Screen: AMSL – Watch – QFE



| Button functions | |
|------------------|---------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Nulování QFE |
| Blue long press | Change units (if enabled in the setup menu) |
| | |

- • Display of current altitude (m or ft) above sea level (AMSL).
- • Display of flight time. Automatic or manual start.
- • Display of QFE altitude, i.e. from start or from reset.
- • Arrow vario on the left.
- • Altitude is rounded to an integer.
- • Long press of the red button resets QFE if we are not flying.
- Long press of the blue button resets the units (if enabled in the setup menu). The max, min and takeoff altitude values are retained and are only recalculated.
- • The size of the numbers adapts to the displayed value.
- • The stopwatch will START automatically if the GPS speed is higher than 10km/h for 5 seconds.
- • The stopwatch will STOP automatically if the GPS speed drops below 5km/h for 15 seconds.
- • The QFE will be automatically reset at takeoff.

Screen: AMSL - Watch - Speed



| Button functions | |
|------------------|---------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | |
| Blue long press | Change units (if enabled in the setup menu) |

- Display of current altitude (m or ft) above sea level (AMSL).
- Display of flight time. Automatic or manual start.
- Display of speed from GPS. GPS position must be focused otherwise speed will be 0.
- Arrow vario on the left.
- Altitude and speed are rounded to a whole number.
- Stopwatch starts automatically if GPS speed is higher than 10km/h for 5 seconds.
- Stopwatch stops automatically if GPS speed drops below 5km/h for 15 seconds.
- Long press of the blue button resets the units. The max, min and start altitude values are retained and are just recalculated.
- The size of the numbers adapts to the displayed value.

Obrazovka: AMSL – Speed - QFE



| Button functions | |
|------------------|---------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Resetting QFE |
| Blue long press | Change units (if enabled in the setup menu) |

- • Display of current altitude (m or ft) above sea level (AMSL).
- • Display of speed from GPS. GPS position must be focused otherwise speed will be 0.
- • Display of QFE altitude i.e. from start or from reset.
- • Arrow vario on the left.
- • Altitude and speed are rounded to a whole number.
- • Long press of the red button resets QFE.
- Long press of the blue button resets units. The max, min and start altitude values are retained and are just recalculated.
- • The size of the numbers adapts to the displayed value.

Screen: Dual display



| Button functions | |
|-------------------------|-----------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | |
| Blue long press | |

- • Combined display of values in both units.
- • Arrow vario on the left.
- • Height and speed are rounded to the nearest whole number.
- • The stopwatch starts automatically if the GPS speed is higher than 10km/h for 5 seconds.
- • The stopwatch stops automatically if the GPS speed drops below 5km/h for 15 seconds.
- If the stopwatch is running, it can be stopped by long pressing the red button. The time is reset and saved in Laps, where the last 5 measurements can be displayed.
- Be careful, the time will not be saved when the device is turned off! To save the time, you need to stop the time automatically / manually and then turn off the device.

Screen: Max / Min



RED long to reset

| Button functions | |
|------------------|---------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Reset max and min value |
| Blue long press | Change units (if enabled in the setup menu) |

- Display of maximum and minimum altitude (m or ft) AMSL.
- Display of maximum and minimum vario value.
- Display of maximum speed.
- Altitude is rounded to a whole number.
- Vario values are displayed with one decimal place.
- Long press of the red button resets the values, i.e. sets the current AMSL altitude. Vario and speed will be set to 0.
- Long press of the blue button change the units.

Screen: Laps

Laps 72 Act:0:00:00 1:01:16:49 18:47 11/07/2023 4: 00:00:18 16:28 09/07/2023 3:00:00:15 16:27 09/07/2023 2:00:00:16 21:11 08/07/2023

| Button functions | |
|------------------|-----------------------------------------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Stop the stopwatch if it is running. Clear all saved times if the stopwatch |
| | is not running. |
| Blue long press | |

- Display of the last four measured times. The times are saved in memory and are loaded even after switching the device off/on.
- In addition to the measured time, the UTC time and date when the stopwatch landed/stopped are also saved.
- Time and date format HH:MM DD/MM/YEAR
- If UTC time is not available (no GPS fix), 00:00 00/00/2000 is saved
- If the stopwatch is running, a long press of the red button stops it, saves it and resets it.
- If the stopwatch is not running, a long press of the red button deletes all recorded times from the memory. The inscription "Clearing" appears and disappears after about 1 second. This is an irreversible operation.
- The stopwatch cannot be started manually in this menu.
- Times are automatically overwritten after four records are filled. After switching on the device, they are not recorded in the time of lap one, but in the next position after the last recorded one.

Screen: Reminder time



| Button functions | |
|------------------|--------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Reduces the reminder time by -1min |
| Blue long press | Increases the reminder time by +1min |

- Setting the reminder time. If we are "flying", i.e. the stopwatch is running (started automatically or manually), the reminder time is counted down. After the time has elapsed, the blue diode above the buttons will start flashing in 0.5 second intervals.
- **Every** value: reminder time.
- **Run** value: how much of the countdown has elapsed. Display "NOW" if the diode is flashing. Display 00:00:00 if we are not flying.
- The diode flashing can be stopped by briefly pressing any button (in any menu).
- The reminder will then start counting down the same time.
- The reminder time can be adjusted even when the countdown is running.
- If the reminder time is set to 0 min, the reminder will not be active.
- A long press of the red button will reduce the reminder time by 1 minute.
- A long press of the blue button will increase the reminder time by 1 minute.
- The maximum time value is limited to 240min.
- The set reminder value is stored in memory and is reloaded the next time the device is turned on.
- UTC time display if GPS is available.

Note: This functionality is aimed at situations where you want to check or perform something at regular intervals. For example, checking other instruments, fuel, canopy, reporting, planned quarter/half of flight time, etc. Especially in the beginning, it can be difficult to automate these tasks and not forget to do them regularly.

Screen: Settings



Bluetooth:Disabled BT name:AltiSAN-3A

RED long to modify

| Button functions | |
|------------------|---------------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Entering the settings menu |
| Blue long press | Change units (if enabled in the setup menu) |

- Summary display of set variables.
- Pri units: set primary height units (meters, feet)
- Sec spd units: Speed units when displaying altitude in feet (mph, knots).
- Set ALT using: For setting AMSL in QNH menu, altitude (m, ft) or QNH will be used.
- Step set: In the case of setting AMSL using height, the setting step will be of size.
- ٠
- Bluetooth: Enabled/Disabled
- **BT name:** Bluetooth device name for pairing.
- By long pressing the red button you enter the menu where the values can be adjusted, see Setup menu.
- Change units (if enabled in the setup menu)

Setup menu

Extra menu for setting some variables and Bluetooth communication.

Setup Bluetooth



| Button functions | |
|------------------|--------------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Turns Bluetooth communication on/off |
| Blue long press | Turns Bluetooth communication on/off |

- Enable or disable Bluetooth communication.
- When BT is enabled, the name under which the device can be paired is displayed. It is in the form "AltiSAN-xx", where xx is the last part of the device address. It is used to distinguish if there are multiple devices in the same location.
- The line "Adr:" displays the device address.
- Turning on BT has a major impact on battery life. When connected to a mobile phone (XCTrack) with BT, the power consumption is about a fifth higher. When BT is turned on but not connected to a mobile phone, the battery life is reduced by about 5%. So if you are not actively using BT, I recommend leaving it completely deactivated.

BT data type



| Button functions | |
|------------------|------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Switches data protocol |
| Blue long press | |

- Displays the data protocol that the device uses to communicate via BLE.
- Pressure the device identifies itself as a pressure sensor
 - o Environmental Sensing Service (0000181a-0000-1000-8000-00805f9b34fb)
 - *Pressure characteristic (00002a6d-0000-1000-8000-00805f9b34fb)*
- LK8EX1 a standardized protocol that transmits pressure value and battery charge level in BLE UART mode.
 - Nordic UART Service (6e400001-b5a3-f393-e0a9-e50e24dcca9e)
 - TX char (6e400003-b5a3-f393-e0a9-e50e24dcca9e)
- Both protocols are supported by XCtrack.
- If you don't know what to choose, leave the default Pressure.
- When changing the protocol, it is necessary to exit the Setup menu and turn the device off/on!

Alt Unit setup



| Button functions | |
|------------------|----------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Change units kt > mph > kt |
| Blue long press | |

• Setting the height (Altitude) units, so-called primary units

Spd Unit setup

| Spd Unit setup 85 | Spd Unit setup 99 |
|--------------------------------------------|----------------------------------|
| Second speed unit: miles per hour - mph | Second speed unit: knots - kt |
| | |
| | Allerand 54:45:52:30:23 |
| | |
| RED long to change | RED long to change |

| Button functions | |
|-------------------------|----------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Change units kt > mph > kt |
| Blue long press | |

- Setting speed units when displaying altitude in feet
- Speed units for meters are always km/h

Unit switching

Unit switching 85 Blue button switch between units on most screens: Disabled

RED long to change

| Button functions | |
|------------------|--------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Enabled / Disabled |
| Blue long press | |

- Enables switching units using the blue button on most screens
- If you don't use switching, turning this feature off may make it easier to switch screens using the blue button

QFE reset



| Button functions | |
|------------------|--------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Enabled / Disabled |
| Blue long press | |

- Enables automatic reset of QFE at the start of the flight, i.e. with the start of the stopwatch
- When this function is disabled, it is necessary to manually reset QFE on some screen before starting!

ALT setup



| Button functions | |
|------------------|-----------------------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Switch between QNH a Height units |
| Blue long press | |

• Sets whether the altitude in QNH setup is set using QNH or height units (meters/feet)

• If set to Height unit, the manually set altitude is saved in memory and used again the next time you turn it on. This is useful in situations where you repeatedly take off from the same place and do not have to correct the QNH. It is set automatically.

• Also useful in situations where you know the altitude and do not want to derive or search for QNH

• If you are in an airport area or want to communicate with air traffic, I recommend always setting according to the QNH of the nearest airport or regional QNH



| Button functions | |
|------------------|--------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Change value by -1 |
| Blue long press | Change value by +1 |

• If Height settings is set on the previous screen, you can choose the step in which you will set the height value.

• If QNH is set on the previous screen, the QNH step cannot be set and is always 0.25







This is what turning on the device and waiting for GPS looks like

GPS starting to catch up someting, because the date and time have appeared. The number of satellites, however, is not sufficient, so it is still waiting.

| Button functions | |
|-------------------------|-----------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | YES / NO |
| Blue long press | |

- When this function is enabled (YES), the device will wait for a GPS signal when it starts up and if it detects at least 7 satellites, it will read the height from the GPS and set it as AMSL.
- This wait can be canceled by long pressing the red button.
- It is possible that the GPS height will NOT correspond to your actual height. Sometimes it is a few meters, but it can be a hundred. The height measurement from the GPS is accurate only if there are enough satellites.
- It is possible to adjust the height additionally in the QNH menu. In the QNH menu, you can compare the GPS height (GPS A) with the height derived from pressure (AMSL).
- This function is intended to speed up the initial setup.
- GPS height is NOT used during flight. Everything is subsequently read according to the baro sensor.
- It is practically impossible to catch a GPS signal if you are in a building. This device does not have such a sensitive receiver as mobile phones.

Save & Exit



| Button functions | |
|------------------|----------------------|
| Red short press | Previous screen |
| Blue short press | Next screen |
| Red long press | Exit from Setup menu |
| Blue long press | |

• Long press the red button to exit the Setup menu and save the settings.

Screen: Setup correction

| QNH:1014.25 |
|--------------------|
| Temp:30.1C |
| Press:984.2 |
| Press corr:984.86 |
| AMSL:261.7m |
| AMSL:859ft |
| Corr press: 1.0007 |
| Bat:4126mV 92% |
| |

QNH: set value Temp: internal temperature Press: pressure from sensor Pr. corr: adjusted pressure from sensor AMSL: altitude in meters AMSL: altitude in feets Corr press: pressure correction value (0.9900 – 1.0099) Bat: battery voltage in mV and battery percentage

| Button functions | |
|------------------|------------------------------------------------------------------|
| Red short press | Decrease the correction value by 0.001 |
| Blue short press | Increase the correction value by 0.001 |
| Red long press | Resets the entire device to its default settings – Factory reset |
| Blue long press | |

- It is used to set the barometer (pressure) correction. If the height value does not correspond to reality when setting the correct QNH (it is off by more than about 10m or 32ft), it can be adjusted using the correction.
- Calibration is performed during production and these values are adjusted if necessary. I do not recommend changing them by default.
- The device also takes temperature into account when calculating the height. If the temperature of the device does not correspond to the environment, distortion occurs.
- The recommended pressure correction value is in the range of about 0.9990 1.0010).
- The QNH value and units need to be set during normal power-on and then enter this menu.
- After changing, turn the device off / on. The changed values are saved immediately.
- This menu can only be accessed by holding down the *blue* button when turning ON the device until this menu appears.

How to pair with XCTrack

From version 1.5 it is possible to use only if your mobile phone can communicate with Bluetooth LE (BLE).

If you have such an old mobile phone that it does not support BLE, then download and use Firmware 1.4 and XCTrack version 9.10.5! For XCTrack from version 9.11.x it is necessary to use firmware 1.5 and higher. I found that on most new phones otherwise XCTrack does not receive data from AltiSAN. But there are phones that can. We cannot ensure full compatibility with the XCTrack developers and so I had to change the communication protocol.

- 1. Enable Bluetooth on your device
- 2. Enable Bluetooth on your mobile phone
- 3. There is no need to pair the device in the Bluetooth menu of your mobile phone, or it will refuse to let you use the application...
- 4. Start XCTrack in mobile
- 5. In the Settings menu, select "Connections & Sensors"
- 6. Click the ADD button, select "Bluetooth sensor" and from the displayed device list, select AltiSAN-XX (corresponds to your device name)
- 7. Click on the device name and then on "PRESSURE SENSOR CALIBRATION" and verify that the device is sending data.
- 8. The recommended "Smoothing" level is approximately 0.14-0.2 depending on your preference
- 9. The next time you start XCTrack, you no longer need to select a sensor. All you need to do is turn on BT on your mobile phone and device. Pairing will occur automatically. If there is a problem with pairing, try turning AltiSAN off/on and pairing immediately after turning it on. Make sure that BT is not turned off in AltiSAN.



You can click on the name to edit it to the following (but it is not necessary):

| ← Připojení & Senzory | ← Kalibrace tlakového čidla |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Shoda s FAI CIVL Pro shodu s FAI CIVL požadavky musi být použity pouze interní senzory, Interní bara sensor je povinný a nesmí být vynuceno použití Location API. | Atm. tlak Výška Stoupání 98975Pa 197,52m +0,01m/s (2/sec) 197,470m±0,056m |
| AltiSAN-2E Bluetoath LE (78:E3:60:19:3F:2E) Dostupná data GPS P Ø Barometrický tlak C kompas V zdušná rychlost (airspeed) Rychlost a směr větru F fanet/Flarm data Otočit vitro 180 stupnů | 198.0m |
| B T ZRUŠIT ULOŽIT Z | 197.0m. Vyhlazeni 0,1456 |

The pressure value is sent directly. XCTrack converts this value to altitude itself. For the best match, it is necessary to manually set the QNH value in XCTrack to the same as you have in AltiSAN before each flight!



Format of data sent via Bluetooth:

When the device is identified as a pressure sensor. *Environmental Sensing Service (0000181a-0000-1000-8000-00805f9b34fb) Pressure characteristic (00002a6d-0000-1000-8000-00805f9b34fb)*

When the device identifies itself as a UART and sends LK8EX1. Nordic UART Service (6e400001-b5a3-f393-e0a9-e50e24dcca9e) TX char (6e400003-b5a3-f393-e0a9-e50e24dcca9e)

How to update firmware

It is possible to update the SW in the device manually. You will need a laptop or mobile phone with Wi-Fi. For your mobile phone, make sure it remains connected to Wi-Fi that does not have access to the internet. Unfortunately, some phones have a problem with this and cannot be used for the update.

Download the appropriate version for your hardware from the manufacturer's website www.sintak.org. You can find out the HW version and the current SW version when you turn it on. The device can be updated, but also downgraded. It is possible that you will find several SW versions for your HW on the website.

Do not upload firmware for a different HW version than yours! The device does not verify the correctness of the uploaded file and this may cause the device to black brick. The device is not destroyed, but this cannot be repaired by the user. Contact the manufacturer and agree on further steps.

Description of the update from Windows 10 environment

- 1. Download the firmware file to your disk and extract the ZIP file. The firmware file has the extension *.BIN
- 2. Make sure your device is charged to at least 50%.
- 3. Turn on AltiSAN and hold down the red button until the update menu appears (approx. 5 seconds), see picture.



- 4.
- 5. The device turned on its Wi-Fi and began broadcasting an SSID (access point) called AltiSAN-OTA.
- 6. On your computer, search for this Wi-Fi network and connect to it. You will be asked for a password when connecting. Enter OTAotaOTA . Be careful with upper/lower case letters. The password is also written on the device screen.
- 7. The computer will not like that it cannot access the Internet, but that is okay. It will only communicate with AltiSAN.
- 8. Launch an Internet browser on your computer.
- 9. Enter the address: http://192.168.31.31/update ATTENTION, it's really just http without the "s"
- 10. This ElegantOTA page should open.

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|----------|-------------|-----------------------|--------------------|------------|-------------|-----------|------------|---|
| | Not secure | 192.168.31.31/update | * 0 | ± ± (| 🚓 Incognito | New Chrom | e availabl | |
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| | | Ð | Select File | | | | | |
| | | | SETTINGS | | | | | |
| | | OTA Mode | Firmy | vare | | | | |
| | | Dark UI | | | | | | |
| | | Hardware ID | | a | | | | |
| | | Firmware Version | | a | | | | |
| | | 🔆 Upgrade to Pro - Ge | t access to brandi | ing and mo | re! C | | | |

- 11.
- 12. Click the "Choose File" button and find the file with the new firmware on your disk.
- After selecting it, the recording will start immediately. It takes about 80-160 seconds. The transfer is relatively slow, about 320 Kb/s. It is possible that it will immediately jump to 100% instead of the percentage "running". Wait until the device restarts itself!

| S BegantOTA Lite × + − □ × | BlegantOTA Lite x + - □ X |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
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| ElegantOTA | |
| Starting OTA Process 0% | Uploading firmware-HW4.1-SW1.4.bin |
| 😽 Upgrade to Pro - Get access to branding and more! 🖉 | Vpgrade to Pro - Get access to branding and morel |

14. Once completed, an OTA Success confirmation will appear and the device will reboot itself.

| ← → | C 🛆 Not secure | 192.168.31.31/update | * | ේ ව | 유 Incogn | ito New Chrome availabl |
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16. Done. The computer has disconnected itself from the temporary network. Try turning AltiSAN off and on again mechanically and check that everything works.

Charging your device

The battery status in percent is displayed in the upper right corner of most screens. The USB port on the front of the device is used for charging. Connect the cable at a slight angle that matches the inclination of the top. Use any USB charger, e.g. from a mobile phone. The charger's power is 500mAh. "Fast charging" is not supported. The device regulates charging itself and does not communicate with the charger in any way. The charging current consumed is approximately 400mAh. During charging, the indicator diode (to the left of the USB port) glows blue. When fully charged, it goes out. The typical charging time from approximately 20% to 100% is approximately 3 hours. Charging can be interrupted at any time by disconnecting it. The device can be connected and operated even with the charger connected. If the device is turned on and charging at the same time, the charging percentages may be distorted (they will be greater than the actual charge). You can consider the real charge level to be the state after about 5 minutes after disconnecting the charger.

I strongly recommend charging the device when the battery drops below 30%, especially if you have Bluetooth turned on.

When the battery reaches 2%, the device will automatically switch to deep sleep mode and will not be able to be controlled. The device will display a warning message for one minute and then the display will turn off. ATTENTION, you must switch the power switch to the off position and charge the device!

Do not use the device if the battery is discharged below 20%.

The discharge is not linear and below 20% it discharges faster. Turning on Bluetooth communication will shorten the operating time by about a third.

The device can only be charged when turned on!

Operating temperature when charging 0 to 45°C Operating temperature when discharging -20 to 60°C Storage temperature: -5 to 35°C



Protection against being left on.

If the device is on but you do not press any button for 3 hours, the device will switch to deep sleep mode to minimize battery drain. The device needs to be mechanically turned off and on again for further use.



Be careful to connect the USB charging cable at an angle corresponding to the inclination of the top part. Not horizontally.

Safety

- The device contains a Li-Ion battery. Do not expose the device to high temperatures. Do not throw it into a fire.
- Do not immerse the device in water or other liquids. Store in a cool, dry place.
- Do not press on the display cover, as this may cause irreversible damage to the display.
- The battery is theoretically user-replaceable if you are skilled in soldering.
- When using on a powered paraglider, additionally secure the device with a buckle or string, etc., to prevent the device from falling into the propeller. Do not rely solely on the Velcro.
- Use the device at your own risk.

Service

The device is designed as modular. The individual parts are theoretically also user repairable. It is relatively easy to replace the batteries, buttons or display. With soldering experience, then the motherboard or baro sensor. The device contains software that is user-updating. In case of problems with the SW, contact the manufacturer. The device can be programmed via the built-in USB port, but extra software is required. It is better to use the update via Wi-Fi.

You can find the manufacturer's contact information at <u>www.sintak.org</u>

