

Altis nano

Recording / Competition Altimeter with Telemetry



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1. Specifications

- ✧ Memory: 7.91MB (several days of record, logging altitude, voltage, temperature, throttle In/Out)
- ✧ Sample time: 0.1 – 25.5s (user selectable in 0.1s steps)
- ✧ Dimensions: 29 x 11.5 x 6.5mm
Cable length approx. 10cm
- ✧ Weight: 6g with JR cable
- ✧ Power supply range: 4 – 12.6V
- ✧ Logging:
 - altitude
 - voltage
 - temperature
 - throttle input and output
- ✧ Conforms to all existing competition rules (FAI F5J, ALES, etc.)
- ✧ Records multiple motor runs per flight
- ✧ OLED display (configurable screen)
- ✧ Telemetry support for
 - Jeti Duplex EX®, Multiplex® MSB, Graupner® Hott
 - Futaba® SBUS2, FrSky® S.Port with [Telemetry Converter FF](#)
 - Spektrum DMSS, Hitec HTS-SS with [Telemetry Converter HS](#)
- ✧ Upgradeable firmware
- ✧ [Altis Flight Manager](#) software for Windows

2. Introduction

The AerobTec Altis nano is a barometric altimeter designed especially to record the altitude of R/C aircraft during flight with additional competition features and telemetry support. The unit has very small dimensions and a low weight.

The Altis nano senses barometric pressure variations caused by altitude changes of the aircraft. The altitude is then calculated from pressure data and stored in the internal memory of the device.

The included system allows you to connect to a personal computer with a Windows (7 or higher) operating system via USB. The supplied program will not only read the information from the device and save it to the computer in various formats but it can also display the information in an advanced graph and process the flight information in many other ways.

This altimeter has functions based on FAI F5J and Altitude limiting competitions (ALES) rules so it can be used for these competitions.

The device and the software also provide some other complementary functions such as temperature, throttle or voltage measurement and recording.

3. How it works

The Altis nano uses a modern, fast, digital pressure sensor which allows it to sense very low pressure differences. This gives the unit an altitude resolution below 0.25m with sample rates as low as 0.1s. Since atmospheric pressure changes over time, these changes will affect your measurements. For this reason, long term measurements may not be precise enough. However, the altitude for short term flights, which are common in R/C aircraft, can be recorded very precisely. The measured altitude is stored in the high capacity internal memory which allows several days of recording.

After the Altis nano is connected to a power supply, it will initialize in the first 3s. During initialization, the reference altitude and a zero throttle level are measured. **Note: It is necessary to keep the throttle on your R/C transmitter turned off during this phase. It is recommended to set the initial altitude before each flight by disconnecting and re-connecting the power supply.**

4. Hardware description

Connectors of your Altis nano

Your Altis nano has 4 connectors. They are shown in Fig 1.

IN	– Input signal from the R/C receiver. Power to Altis nano is provided from the receiver via this connector
OUT	– Output signal to ESC (Electronic Speed Control)
USB micro	– Connects the Altis nano to a computer via USB
COM	– Molex connector for connection with telemetry equipped receivers as well as future additional features

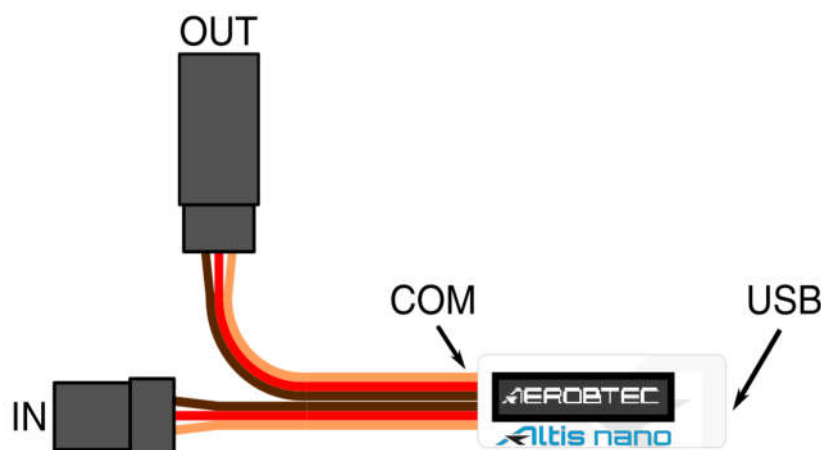


Fig 1: Connectors of your Altis nano

Wire color	Signal
brown	Ground
red	Positive power supply
orange	R/C signal

Table 1: Colors of the connector wires

Mounting in the aircraft

Since Altis nano uses atmospheric pressure for its measurement, it has to have open access to the outside atmosphere. It must not be completely sealed inside the fuselage or other box. As most standard R/C aircraft are not fully sealed, it is usually not necessary to do any special modifications for installation. The Altis nano can simply be put in a free space inside the fuselage.

If the unit is mounted outside the aircraft, the location must be carefully considered. The unit must be mounted away from the airflow caused by the propeller.

Avoid mounting your Altis nano on parts of the plane that might become hot during operation. This may lead to measurement offset during flight in order of several meters.

Connection for data logging only

If the Altis nano device is used purely as a logging device, connect the device to any free receiver channel as shown in Fig 2. The signal polarity must be observed as shown in Table 1.

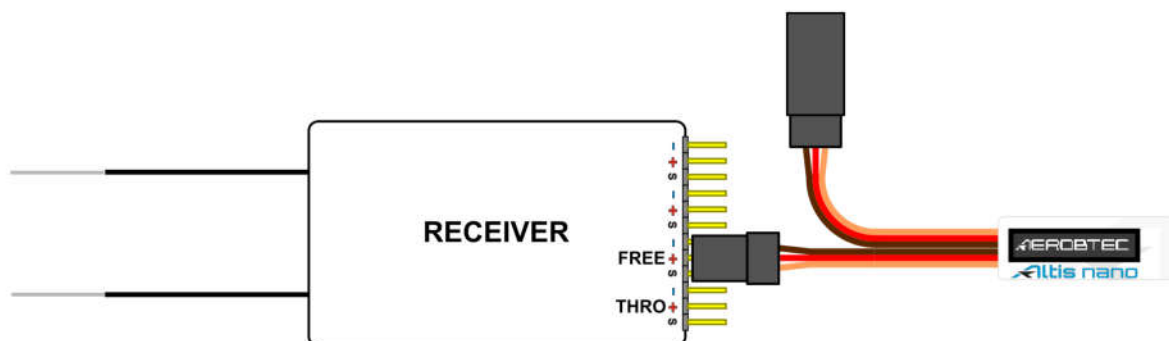


Fig 2: Connection scheme for data logging only (FREE – free receiver channel)

Competition connection with internal BEC

For competition use (like F5J FAI, ALES, etc.) the JR input cable has to be connected to the R/C receiver, and the JR ESC cable has to be connected to the output connector on the main measuring unit board. See Fig 3. The signal polarity must be observed as shown in Table 1.

If you use a separate power source for your receiver like external BEC (battery eliminator circuit), you should make sure to separate your power supply from your ESC and the Altis nano. This is done by disconnecting the red wire from the ESC connector. This is not usually necessary for "Opto" ESCs. The disconnected red wire must be insulated to ensure that it does not cause any short circuit or other problems. See Fig 4.

Some radio systems provide telemetry functions. These functions allow wireless transmission of certain data from the aircraft during the flight and display it on your Tx or monitor screen. The Altis nano has COM connector reserved for this purpose. Use a Molex/JR telemetry cable (sold separately) to connect your Altis nano to the telemetry input of your receiver.

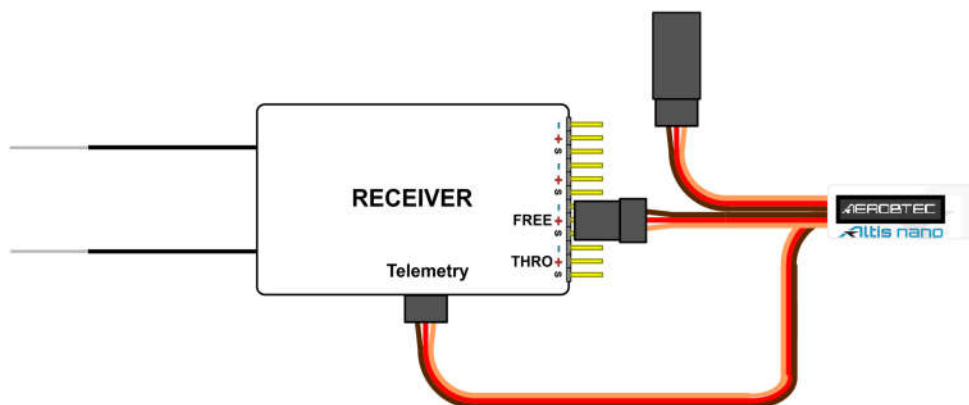


Fig 5: Telemetry connection

The schematic in Fig 5. shows the direct connection of Jeti model Ex, Multiplex MSB and Graupner Hott. Some other brands are supported using [Telemetry Converter FF](#) or [Telemetry Converter HS](#).

USB connection

When you wish to download your logged data to a computer or change the settings of your Altis nano, connect the Altis nano using a standard micro USB cable (sold separately) to a computer with Windows XP or newer operating system. See Fig 6. When you connect your Altis nano for the first time, the computer should install the drivers automatically. You need to have the [Altis Flight Manager](#) program installed in your computer to display any stored data and make changes to your settings.

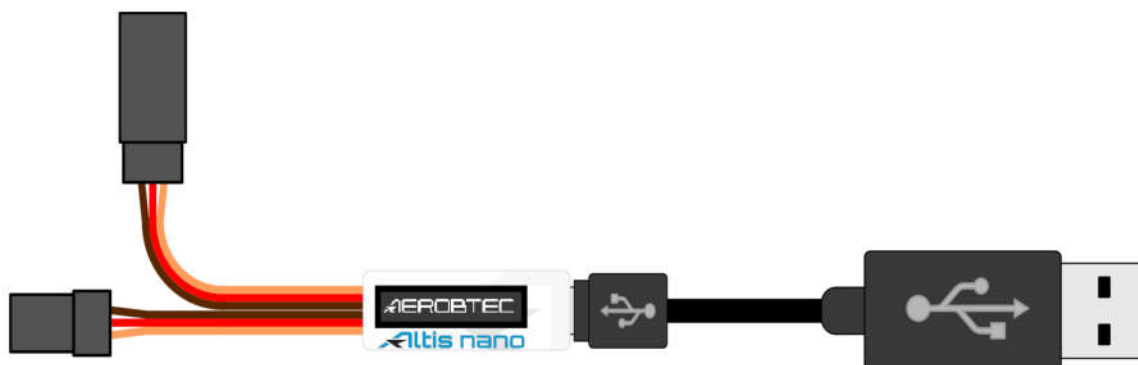


Fig 6: USB cable connection

5. Altis nano screens

The Altis nano is equipped with an OLED display with great visibility in sunlight. There are several screens displayed when you use the device. These screens are shown in Fig 7.

Initialization screen

When you connect the device to your aircraft, the Altis nano informs you about the 3s initialization phase by displaying the initialization screen. This screen also shows the firmware version and the serial number of your device. It is not recommended to disconnect the device when you see this screen.



Fig 7: Various screens: a) Initialization screen b) F5J screen c) Do not disconnect screen d) USB mode screen

F5J screen

This screen shows the firmware version and the F5J height as specified by FAI F5J rules.

The F5J height is indicated by 3 + 1 digit number. If there is no F5J detected or the motor was restarted, - - - . - is shown on the screen instead.

Settings screen

This screen shows the basic competition settings right after initialization, such as time and altitude switch, if the motor or competition restart is enabled and if F5J height is measured. This screen has several pages.

Measure screen

This screen shows basic information about device and record on the screen.

Do not disconnect screen

When logging data, there are times when it is dangerous for the device to be disconnected. If the Altis nano is disconnected at these times there is a danger of losing all your data in the device. This is indicated by the "Do not disconnect screen". **Do not disconnect the device when you see this screen!!!**

It is not recommended to disconnect the device during the initialization screen, too.

USB mode screen

When you connect your Altis nano to a computer, the device stops its competition and logging functionality and provides its data to the computer. This data is indicated by the USB mode screen.

6. Work with Altis nano in the Altis Flight Manager

The AerobTec Flight Manager (AFM) is a PC application for Windows which allows you to communicate with Altis nano and other devices made by AerobTec and to display and process the flight data recorded by them.

Altis Flight Manager can be downloaded from <http://aerobtec.com/altis-flight-manager/#download>

Note: There is a separate manual for AFM. However, the following pages describe how to set up your Altis nano according to your needs. In order to connect to the device click **Tools -> Device** or Device icon on the toolbar. A window will appear. See Fig 8. Choose Altis nano. AFM then automatically connects to your Altis nano. If there is more than one Altis nano connected to your computer, you will be asked to choose which one you wish to connect. When connected, Altis nano screen window will be displayed.



Fig 8: Device choosing window

Altis nano window

There are two parts of the window. The upper part shows general information about the device – its firmware version, serial number and used memory.

The bottom part of the window is used for settings.

Downloading data

In order to access the logged data from your Altis nano, use the **Download data** button. Once the data is downloaded, you can close the Device window and work with the data.

Erasing data

In order to erase the logged data from your Altis nano, use the **Erase data** button.

Formatting device

In order to format Altis nano memory into factory settings, use the **Format device** button.

Resetting flight counter

Altis nano is counting flights so saved log files are with unique number. In order to reset this counter and to start counting log files from zero again, use the **Reset flt. counter** button.

Settings

There are many possible configurations for the Altis nano. You can set your Altis nano according to your needs. This is done by using the settings tabs in the bottom part of the window.

There are several tabs:

Logging Settings (Fig 9) – Here you can set how you wish to store the flight parameters to your device

memory. The basic parameter, Sample time, determines how frequently the parameters will be logged.

You can set which parameters you wish to log. You can log altitude, temperature of the device (note: the device is usually several degrees warmer than its environment), input throttle PWM (signal from the R/C system), output throttle PWM (signal to ESC) and the voltage on board (the voltage Altis nano is powered from).

Note that the more parameters you log or the lower the sample time is, the more memory it consumes. However, there is memory enough to log several days of data when logging almost all available parameters.

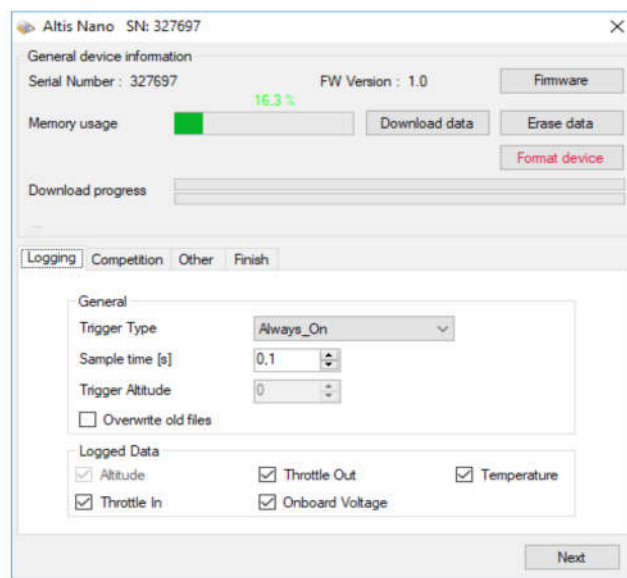


Fig 9: Logging settings

You can choose also a trigger type – this determines when your device starts logging. There are the following options:

- Always on – Data logging begins once the device is initialized
- RC trigger – When Altis nano is connected to a receiver channel controlled by a switch on your R/C transmitter. You will activate the logging manually by turning this channel on. Note that this option is not available for some of the competition settings.
- Altitude trigger – The device starts logging when the plane reaches a certain altitude. It is possible to set your desired altitude.

Overwrite old files lets the device to erase old files in case the memory is full.

Competition settings (Fig 10) – There are several pre-programmed standard competitions. You can simply choose the one you want from the Competition Type list. This choice sets the proper values of all necessary parameters.

Of course, you can customize the parameters according to your needs. For example, you can set a motor switch at certain altitude or at certain time.

Meaning of General competition settings parameters:

Altitude switch – 10s measuring window starts when plane reaches preset altitude

Time switch – 10s measuring window starts when preset timer is timed out

Altitude start – competition starts when altitude is higher or equal to 5meters

Throttle start – competition starts when throttle output is higher than 1200 μ s

Throttle switch – 10s measuring window starts when throttle output goes under the 1180 μ s

F5J FAI / F5J Height measurement – measures start altitude as defined by F5J FAI rules

F3K mode – measure highest reached altitude on every throw, trigger altitude defining new throw is equal or greater than 5 meters

There are also several preset competition formats (F5J, ALES150, ALES200) from which user can select.

At the bottom of the Competition Settings tab there are **Safety and Training** settings. **Allow Emergency Motor On** has the following function:

In some competitions it is not allowed to switch the motor on again during the flight. However, you may want to have the ability to switch the motor on again in an emergency situation. The user can choose to enable this or not. If enabled, when the motor is switched on for an emergency the Altis nano restarts the recorded F5J height and it is recorded so it can be shown on the flight graph.

Sometimes during training it is not practical to reset your Altis nano to start a new flight each time you land and launch again. In this case there is the option: **Allow Competition Restart**. It makes the device behave as if it has just been initialized (only for the competition settings) when your plane's altitude drops below 8m.

If user uses Altitude Switch there is possible to activate **Antizoom algorithm**. Its purpose is to take into account the ascending of the model, so the model will fly only to the specified switching altitude after the motor is turned off while ascending.

The antizoom gain specifies the influence of the vario for the calculation of the moment of motor off. The higher the number (maximal value is 2.55), the more vario is taken into account. If antizoom gain is 0, the model behaves as with deactivated antizoom algorithm.

Note: there are several types of firmware. Some firmware types will not allow certain setting changes. Refer to the Firmware types chapter for more information.

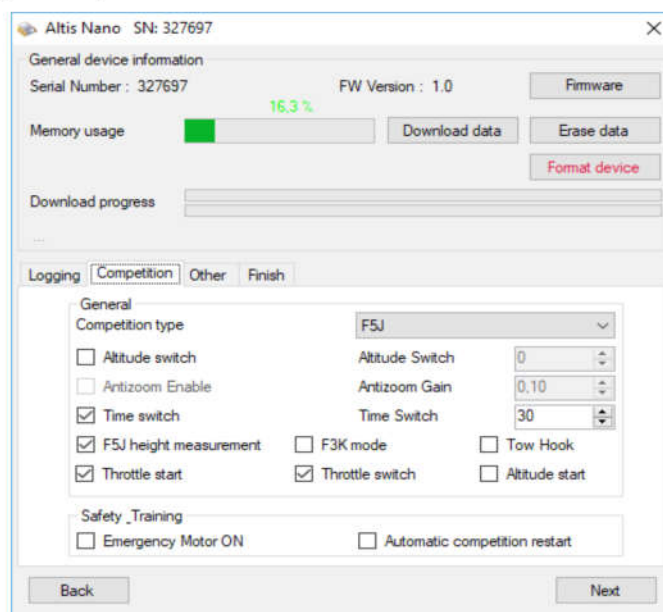


Fig 10: Competition Settings

Other settings (Fig 11) – You can assign a function for COM port and change screen that can be shown on the display.

User can choose from these screen types:

- Standard F5J screen
- Measure screen with several data. The order of data is following:
 - Free Memory Remaining free memory for log files
 - Max G Alti Maximal altitude for whole log file
 - Vario Actual vario
 - F5J Height F5J height
 - Glob Time Actual logging time
 - Min Volt. Minimal voltage on JR connector
 - PWM Input Actual PWM input value
 - Alti Actual relative altitude
- Setting screen – a screen with competition settings which is showed for a specified time after initialization screen

User can assign a function for the COM port. Currently this is telemetry, keypad or live output options.

Example of use: if user owns RC transmitter with telemetry link Multiplex MSB and he wants to use Altis nano as a telemetry sensor, he has to select from combo-box „COM Type“ choice „Multiplex_MSB“.

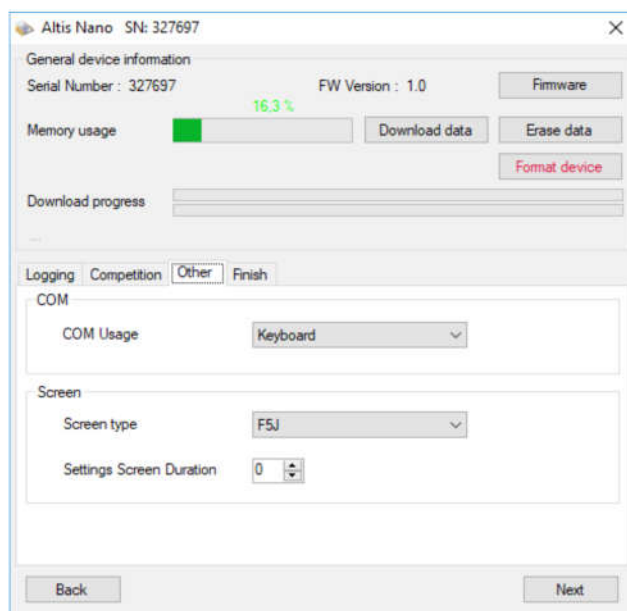


Fig 11: COM and screen settings

Available settings for COM in firmware 1.0 are described in Table 2.

COM
None - inactive
JETI Model Duplex EX
Multiplex MSB
Live Output – for online output of measured data
Graupner HOTT – behaves as Electric Air Module
Futaba SBUS2 with Telemetry Converter FF
FrSky Sart Port with Telemetry Converter FF
Tow hook – For F3X competitions
Device Terminal – Works with Device Terminal
Spektrum DMSS with Telemetry Converter HS
Hitec HTS-SS with Telemetry Converter HS
Keyboard – Works with Altis v4 Keypad
Power Sensor

Table 2: COM settings

Firmware upgrade

When your computer is connected to the Internet and AFM is connected to an Altis nano, AFM compares the firmware version of your Altis nano with the newest currently available firmware and offers to update the latest firmware for your Altis nano if necessary. To upgrade the firmware follow steps below:

1. Click **Firmware** button
2. Choose the firmware from the list.
3. You can choose a different firmware from a file stored in your computer.
4. After the firmware is selected click the button **Upgrade** and follow the instructions on the screen. They will guide you through the upgrade.

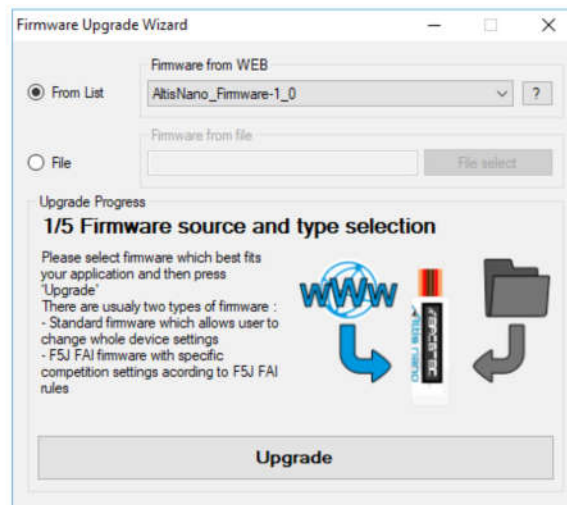


Fig 12: Firmware upgrade window

Firmware types

Note: there are several firmware types:

Standard (1.x) - allows many setting combinations, including settings for F5J competitions. It is recommended to use this firmware type during training and ordinary flights. However, this firmware type is not allowed for use in certain competitions. It should be specified by the organizer of the competition, which firmware is allowed.

F5J (5.x)- This firmware complies exactly with FAI F5J competition rules and no other options are allowed.

F5J_Greek (7.x) - Option with fixed parameters used in Greece

RCEV (8.x) - Option with fixed parameters used in Czech Republic

Backup firmware

If the firmware updates fails or if the process is interrupted, the device tries to update the firmware again until it is successful. Once finished, your Altis nano appears in the computer as a USB removable device again.

If this does not happen or if the first start of the new firmware is not performed from USB, a safety function is activated and backup firmware is written to your Altis nano. Note there is no indication of this state on the screen and the screen is blank.

In this case, follow the firmware update instructions to update a new, valid firmware.

7. Working with Altis KeyPad

Altis KeyPad shown on Fig 13 is an external keyboard for Altis nano. It is used to configure main competition settings of Altis nano on the airport without a computer. Altis Flight Manager version 4.2.0 or newer and firmware version 2.0 or higher are required for Altis nano. F5J firmware support only memory data erase with KeyPad.

In order to use Altis KeyPad do the following:

- Connect it to COM port according to Fig 14.

- Configure COM port to KeyPad mode in the corresponding window shown in Fig 11.
- Turn on Altis nano, it works in a normal way until there is no KeyPad connected.
- When the KeyPad is connected Altis nano detects it automatically and switches to the competition menu mode.
- Navigate the menu items by the side navigation buttons
- Change the values by the middle + and – buttons.
- Push + and – simultaneously on the corresponding menu item if you wish to disable some function (for example altitude switch),
- After you disconnect the KeyPad, the settings are automatically stored in Altis nano.
- Restart your Altis nano to use the new settings.



Fig 13: Altis Keypad

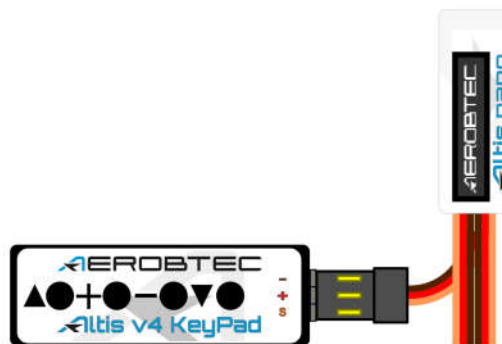


Fig 14: Connection of Altis Keypad

8. Working with Device Terminal

Altis nano settings are accessible also via [AerobTec Device Terminal](#). It is a multi-functional device allowing you to change settings and display results from Altis products. It also contains a servo tester, PWM tester and battery tester.

In order to use it connect the Device Terminal to COM port and select COM Type of your Altis nano to Device Terminal option. AerobTec Device Terminal is also always detected after initialization if connected to COM port. If it is not found, your own settings for COM Type are applied. Follow the instruction on how to move in the menu in Device terminal manual.

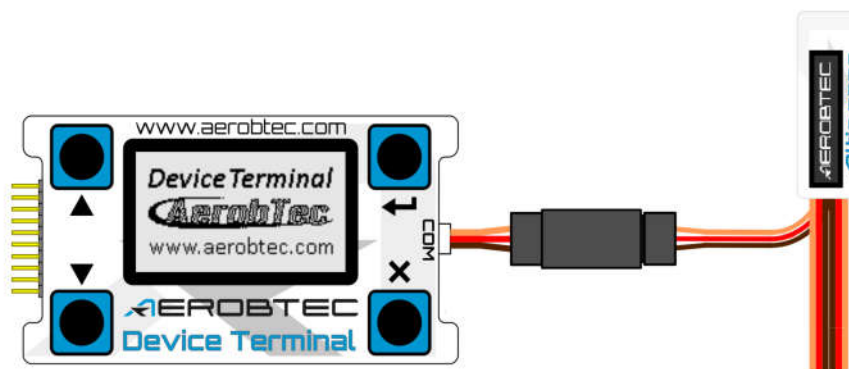


Fig 15: Connection of Altis nano with Device Terminal

The menu items are explained bellow:

Logging

Trig Type	Trigger type
ALT TRIG	Start logging at certain altitude
RC TRIG	Start logging on motor on
ALWAY ON	Log always
Samp Time	Sample time
Trig Alt	Altitude to start logging at
Log Temp	Log temperature
Log Volt	Log voltage
Log ThIn	Log throttle in
Log ThOut	Log throttle out

Competition

F5J	Measures start altitude as defined by F5J FAI rules
F3K	Measure highest reached altitude on every throw, trigger altitude defining new throw is equal or greater then 5 meters
TOW HOOK	F3B competitions using tow hook sensor
Alt Sw.	Switch motor off at certain altutude
Alt Sw. A	Altitude to switch motor off
Anti Zoom	Anti zoom option to compensate kinetic energy – enable option
Anti Zoom	Anti zoom option to compensate kinetic energy – set value
Time Sw.	Switch motor off at certain time
Time Sw.T	Time to switch off the motor
Emer.M.On	Emergency motor on
CompetRST	Competition restart
Alt Start	Start the competition at certain altitude
Thr Start	Start the competition on motor on
Thr Switc	Start 10s measurement windows on motor off

SCREEN

Show	Screen type
F5J	F5J screen
MEAS	Screen with several data
Set. Dur	Duration of settings screen displayed after initialization

COM Type

NONE	No communication
JETI	Jeti model telemetry
MPX	Multiplex telemetry
LIVE	Live output
HOTT	Graupner Hott
FUTA	Futaba telemetry
FRSK	FrSky telemetry
TOWH	Tow hook
ADT	Device Terminal
SPEK	Spektrum telemetry
HITE	Hitec telemetry
KEYP	Keypad

9. Using tow-hook sensor

F3B competitions typically use a tow-hook to pull the model to a certain height where the tow-wire is automatically released. You can use a special wire with a magnetic Litz-loop and a F3B magnetic tow-hook sensor. The connection schematic is shown in Fig 16.

In order to use this configuration select the F3B competition in the competition settings and select tow hook for your chosen port from the COM port settings.

In this case the start height is measured during the period between the start and 10s after the tow hook is released.

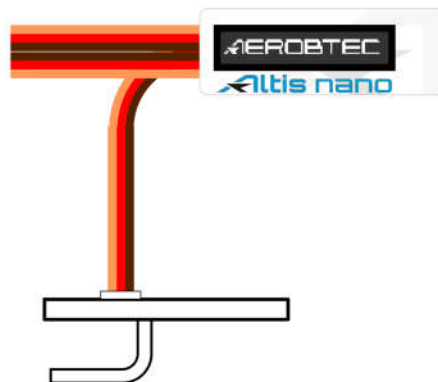


Fig 16: Connection of tow hook

10. Power sensor

Altis nano can be equipped with Power Sensor device by AerobTec. This device provides battery voltage, current, power and energy measurements. These variables can be logged, shown or display or used to disable motor after certain energy is consumed (F3Be competitions).

In order to use the sensor connect it to the battery circuit. Use and solder appropriate power connectors on both sides according to Fig 17. Remember that the wires and connector must be rated to the highest current in the circuit and the soldered connection must be appropriate to the current flowing in the circuit.

Connect the sensor connect it to appropriate COM port, configure the COM port in Altis Flight Manager and choose if you wish to show the variables on display (Screen tab) or if you wish to record them (Logging tab). You can also activate energy switch to switch the motor off when certain energy is consumed.

Power sensor specifications:

- ✧ Voltage: 0V - 60V
- ✧ Current: 42.5A / permanent, 73A / 5min, 100A peaks
- ✧ Dimensions: 21 x 27 x 7mm
cable length approx. 10cm
- ✧ Weight: 14g
- ✧ Power supply: From Altis via Molex connector

- ✧ Resolution: 0.1V, 0.1A, 0.1W, 1Wmin
- ✧ Precision:
 - Voltage 1%
 - Current 2%
 - Power 2%
 - Energy 2%
- ✧ Current sensing High side
- ✧ Digital communication line

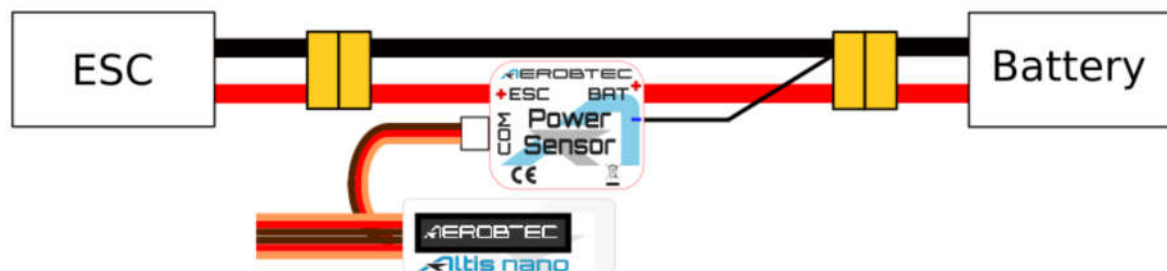


Fig 17: Power Sensor Connection

11. Warning

It is not recommended to supply your whole aircraft via the Altis nano device, however it is possible. The best choice is to use an external BEC circuit or separate power supply.

When manipulating the device and plugging or unplugging the device, do not push the display and the area below it. It is recommended to hold Altis nano on sides.

Do not mount the Altis nano device on aircraft components which might be hot in operation (ESC, batteries)!

Do not touch the Altis nano device to a metal surface, as this might lead to shorting of the power supply and RC system may fail.

Do not put the Altis nano in water, fuel or other liquids!

Before flying with the Altis nano always perform a range check!

Do not disconnect the Altis nano when the, "Do not disconnect" screen (see Fig 7) is shown on the display. It is not recommended to write any of your own files or directories to the Altis nano when it shows as a removable drive in your computer. This might lead to corruption or loss of any data on the device.

Do not disconnect the Altis nano from your PC without using *Safely Remove Hardware and Eject Media* action. This might lead to corruption or loss of the data on device.

12. Frequently asked questions and troubleshooting

1. I see the height on the graph increasing to several meters during a test on the ground. Is Altis nano broken?

No. The barometric pressure depends on the weather. Sometimes it can change variations of several meters in the measured height.

Other cause can be a heated Altis nano. Do not put Altis nano near hot objects in your fuselage.

2. My Altis nano measures F5J height even if do not start the motor. After power on, the F5J height is discarded.

This might be caused by too high zero throttle level. In such case Altis nano considers the signal to correspond to switched on motor. Please check the zero throttle level in your radio system. It must be set below 1200 μ s. Best practice is to use throttle output in range 1000 μ s to 2000 μ s

3. When I fly with Altis nano and stop the motor, it is not stopped and propeller continues spinning slowly. When I fly without Altis nano, the motor break runs correctly.

Try to set fixed endpoints on your ESC.

4. In case AFM can not read the flights from the device or Altis nano does not behave according to the settings, the file system might be corrupted. The reason might be disconnection in a wrong time or not ejecting in Windows.

In order to fix this error, format the file system by clicking the Format device button in Device Window and restarting the device. Or this can be achieved also by renaming Altis nano disk from AE_DISK to AE_DISK1 in *My Computer* folder and restarting the device.

5. I want to allow Emergency Motor On, but (occasionally) it does not work, though all the settings are correct.

The motor off throttle in value might not be present during all the initialization time. In such case default value 1000 μ s is used. The problem appears if your motor off value is above 1000 μ s, so the motor off is not detected and motor is considered active. Extend end the low end point below 1000 μ s. Motor off will be detected correctly also when the motor off value during initialization is not correct.

13. Correct disposal of this product



This product should not be disposed with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. Household Users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract.

This product should not be mixed with other commercial wastes for disposal.

14. Product Registration

If you did not purchase the product directly from AerobTec please mail following information to sales@aerobtec.com. By registering your products you will be informed about updates and notifications.

Name :

Address :*

Country :

Phone :*

Email :

Product :

Serial number of product :

Date Purchased :

Where did you purchased your product? :

* this information is not obligatory

An alternative option is to register at <http://www.aerobtec.com/support/products-registration>

15. Notes

- This manual is based on firmware version 1.0 and Altis Flight manager version 4.2.0
- Information are valid also for regular Altis nano unless stated otherwise

16. Revision History

Rev. 1.0. (April 2018)

- Initial release

Rev 1.1. (June 2019)

- Added Power Sensor