

# ***AerobTec Altis v4+***

***Recording / Competition Altimeter with Telemetry***



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## 1. Specifications

- › Memory: 3.9MB (more than 15 hour record with 0.1s sample rate, logging altitude, voltage, temperature, throttle in)
- › Sample time: 0.1 – 25.5s (user selectable in 0.1s steps)
- › Dimensions: 20 x 33 x 6.5mm  
Cable length approx. 10cm
- › Weight: 8g 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® M-Link, Graupner® Hott, Futaba® SBUS2\*, FrSky® S.Port\*
- › Upgradeable firmware
- › [Altis Flight Manager](#) software for Windows

## 2. Introduction

The AerobTec Altis v4+ is a barometric altimeter designed especially to record the altitude of R/C aircraft during flight with additional competition features with telemetry support. The unit has very small dimensions and a low weight.

The Altis v4+ 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 (XP 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.

\*only with [Telemetry Converter](#)

### 3. How it works

The Altis v4+ 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 approx. 15 hours of recording with the fastest sampling rate (0.1s).

After the Altis v4+ 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 v4+

Your Altis v4+ has 5 connectors. They are shown in Fig 1.

- IN – input signal from the R/C receiver. Power to Altis v4+ is provided from the receiver via this connector
- OUT – output signal to ESC (Electronic Speed Control)
- USB micro – Connects the Altis v4+ to a computer via USB
- COM A, COM B – Molex connectors for connection with telemetry equipped receivers as well as future additional features

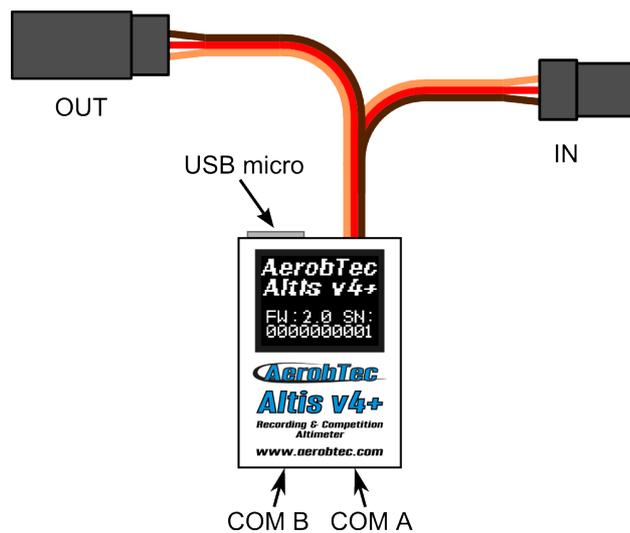


Fig 1: Connectors of your Altis v4+

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 v4+ 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 v4+ 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 v4+ 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 v4+ 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.

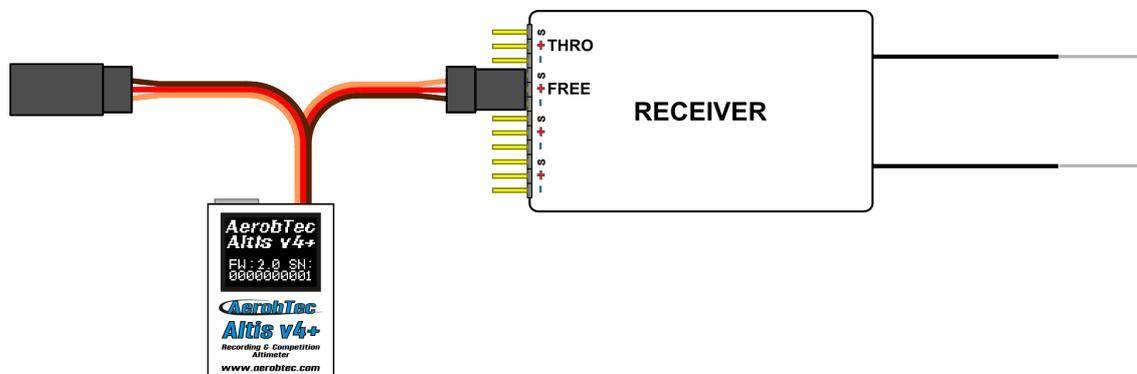


Fig 2: Connection scheme for data logging only (FREE – free receiver channel)

### 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.

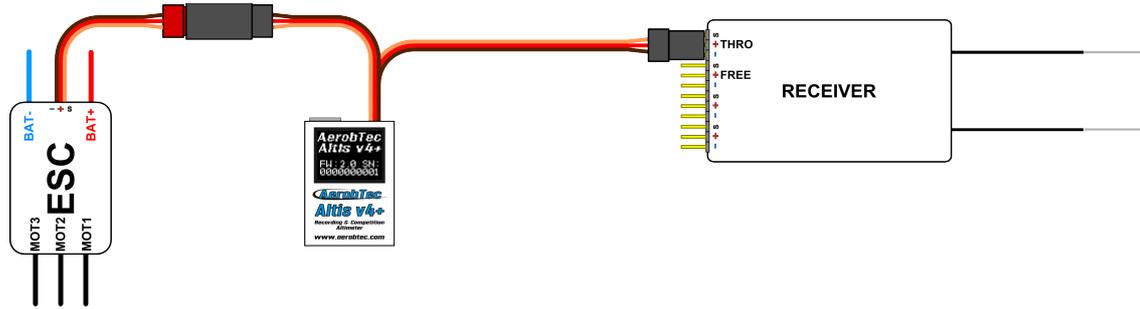


Fig 3: Connection scheme for competition use (ESC - electronic speed controller, THRO - throttle receiver channel)

### Connection with external BEC

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 v4+. 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.

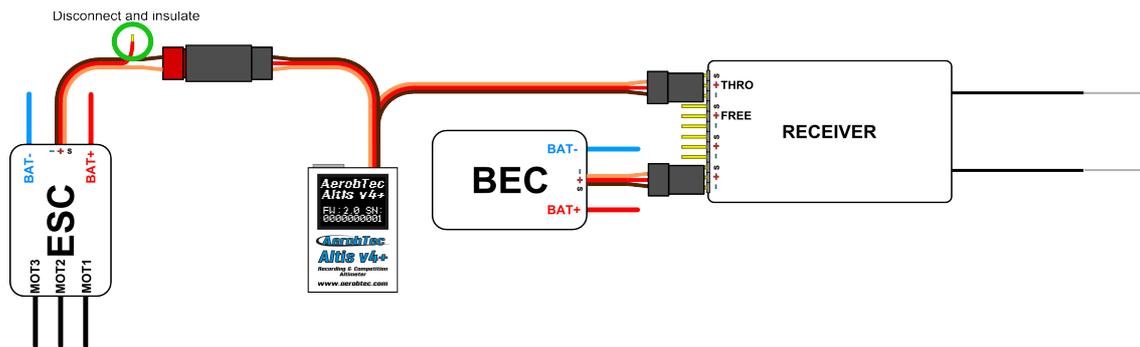


Fig 4: Connection of Altis v4+ with external BEC

### Connection for telemetry

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 v4+ has COM A and COM B connectors reserved for this purpose. Use a Molex/JR telemetry cable (sold separately) to connect your Altis v4+ to the telemetry input of your receiver. See Fig 5.

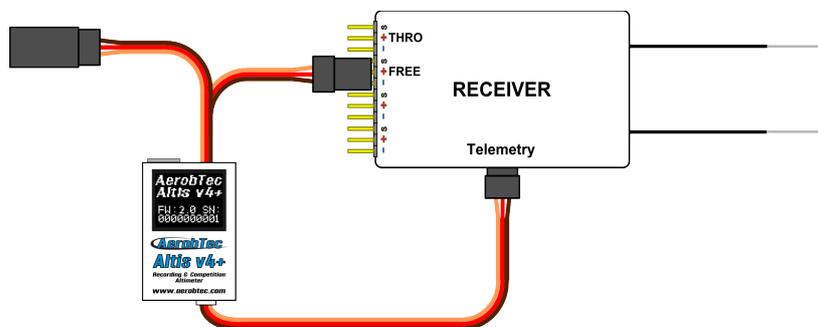
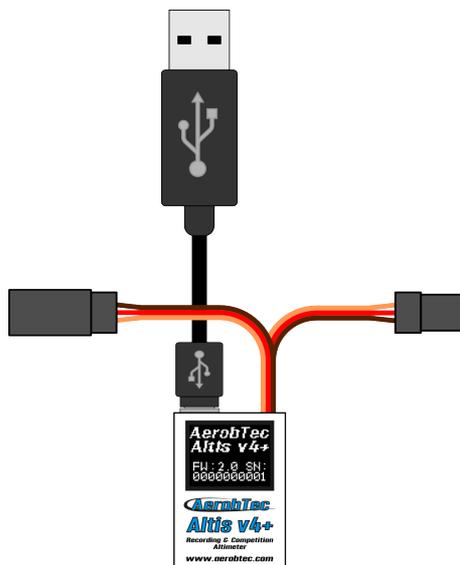


Fig 5: Telemetry connection

## **USB connection**

When you wish to download your logged data to a computer or change the settings of your Altis v4+, connect the Altis v4+ 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 v4+ 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 v4+ screens**

The Altis v4+ 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 v4+ 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.

### **F5J screen**

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

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

### **QR code screen**

This screen displays F5J height in a form of a QR code. This is intended to be read by a third party application to automatically collect the results to the competition IT system like [SORG](#).

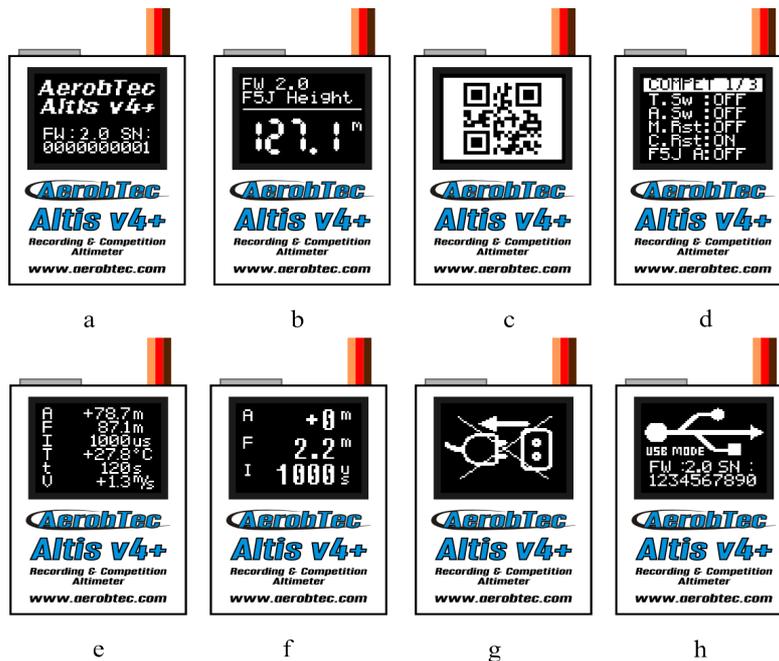


Fig 7: Various screens: a) Initialization screen b) F5J screen c) QR code screen d) Settings screen e) User defined screen with 6 lines e) User defined screen with 3 lines f) Do not disconnect screen g) USB mode screen

### Settings screen

This screens 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.

### User defined screen

This screen allows you to choose which information you would like to display on the screen. There is a version with 6 and 3 lines, respectively.

### Do not disconnect screen

When logging data, there are times when it is dangerous for the device to be disconnected. If the Altis v4+ 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 v4+ 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 v4+ in the Altis Flight Manager

The AerobTec Flight Manager (AFM) is a PC application for Windows which allows you to communicate with Altis v4+ 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://www.aerobtec.com/support/download/>

Note: There is a separate manual for AFM. However, the following pages describe how to set up your Altis v4+ 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 v4+Altis v4+. AFM then automatically connects to your Altis v4+. If there is more than one Altis v4+ connected to your computer, you will be asked to choose which one you wish to connect. When connected, Altis v4+ screen window will be displayed.



Fig 8: Device choosing window

### Altis v4+ 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 v4+, 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 v4+, use the **Erase data** button.

### Formatting device

In order to format Altis v4+ memory into factory settings, use the **Format device** button.

## Resetting flight counter

Altis v4+ 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 v4+. You can set your Altis v4+ 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 v4+ 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 about 15 hours of data when logging almost all available parameters with a Sample time of 0,1s. With different settings you can log up to several days of data.

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 v4+ 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.

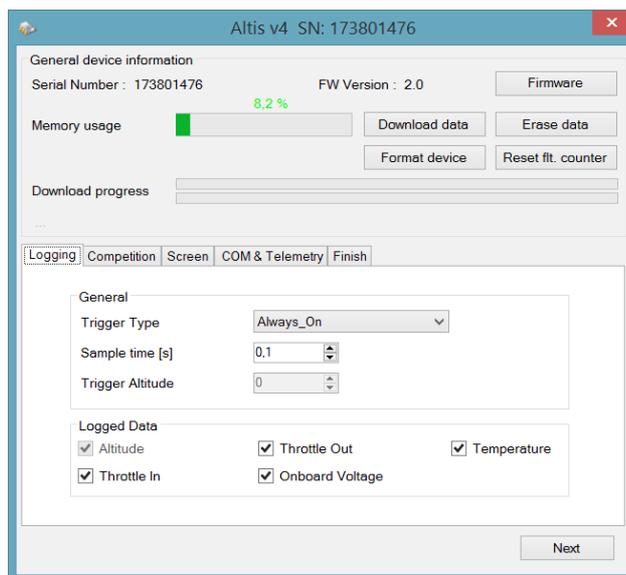


Fig 9: Logging settings

**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** – competition stops when plane reaches preset altitude

**Time switch** – competition stops when preset timer is timed out

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

**Throttle start** – competition starts whent trottle output is higher than 1200us

**Throttle switch** – competition stops when throttle output goes under the 1180us

**F5J FAI** – will measure 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 higher to 5 meters

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

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

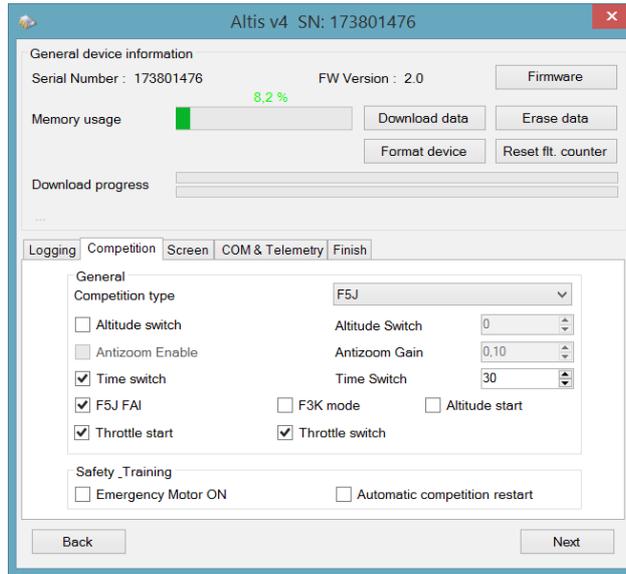
In some competitions it is not allowed to switch the motor on again during the flight. However, you may want to have the ability to switch the motor on again in an emergency situation. The user can choose to enable this or not. If enabled, when the motor is switched on for an emergency the Altis v4+ 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 v4 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.

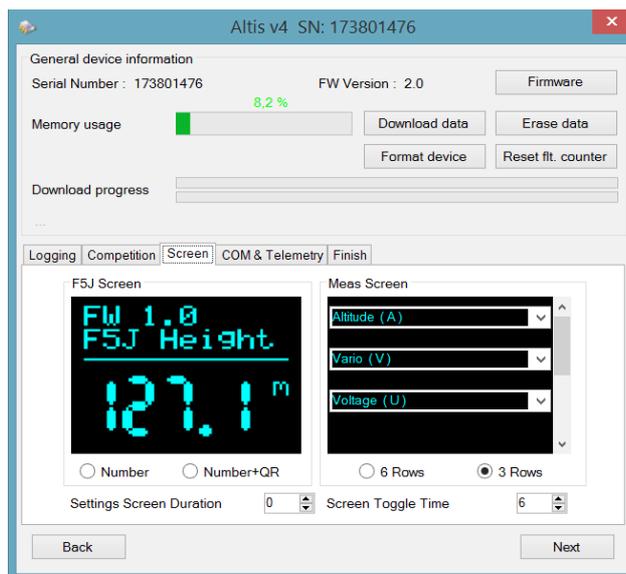


*Fig 10: Competition Settings*

**Screen** (Fig 11) – Your Altis v4 has an OLED display. There are several screens that can be shown on the display. They are described in the Altis v4+ screens chapter. (See page 7).

User can choose from several screen types:

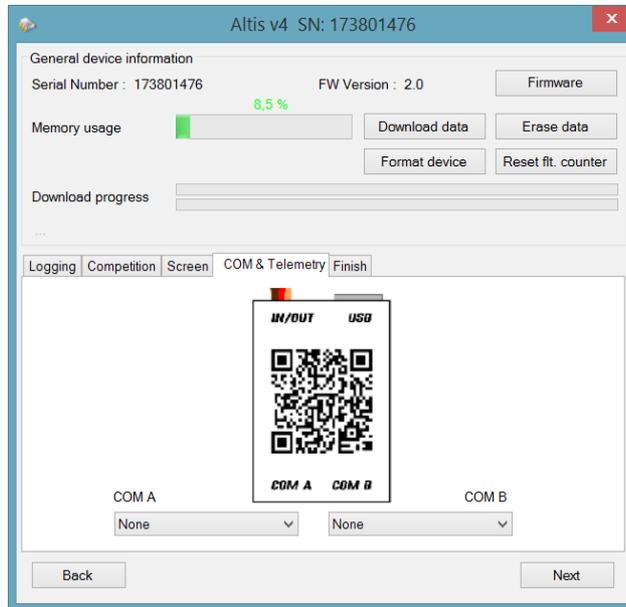
- Standard F5J screen
- Data screen with 6 selectable data lines
- 2 data screens with 3 selectable data lines, which alternate with a selected period
- Setting screen – a screen with competition settings which is showed for a specified time after initialization screen



*Fig 11: Screen settings*

**Com A/B ports** (Fig 12) – You can assign a function for the selected port. Currently there are telemetry, keypad or live output options. These ports are reserved for other future uses.

*Example of use:* if user owns RC transmitter with telemetry link Multiplex M-LINK and he wants to use Altis v4 as a telemetry sensor, he has to select from combo-box „COM A“ choice „Multiplex\_MSB“.



*Fig 12: COM A / COM B Telemetry, Keypad or Live output settings*

Available settings for ( firmware 2.0 ) COM A and COM B are described in table below.

COM A	COM B
None - inactive	None - inactive
JETI Model Duplex EX	Live Output – for online output of measured data
Multiplex MSB	Futaba SBUS2 with Telemetry Converter
Live Output – for online output of measured data	FrSky Sart Port with Telemetry Converter
Graupner HOTT – behaves as Electric Air Module	
Futaba SBUS2 with Telemetry Converter	
FrSky Sart Port with Telemetry Converter	
Keyboard – Works with Altis v4 Keypad	

*Table 2: COM A and COM B settings*

## ***Firmware upgrade***

When your computer is connected to the Internet and AFM is connected to an Altis v4+, AFM compares the firmware version of your Altis v4+ with the newest currently available firmware and offers to update the

latest firmware for your Altis v4+ 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.

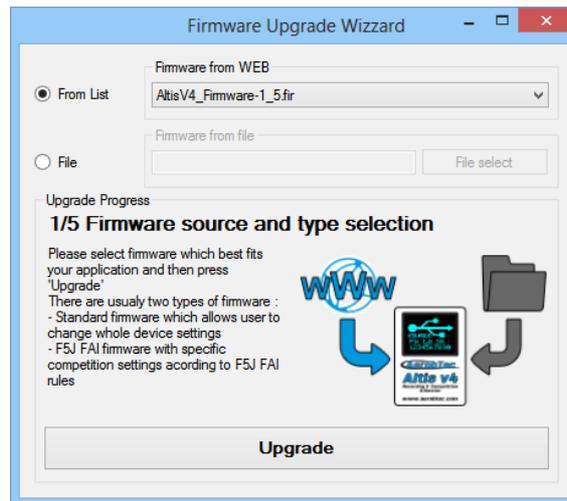


Fig 13: Firmware upgrade window

## **Firmware types**

Note: there are two firmware types. One of them is marked, "F5J". This firmware complies exactly with FAI F5J competition rules and no other options are allowed.

The Firmware marked, "Standard" allows more setting changes, 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.

## **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 v4+ 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 v4+. 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 v4 Keypad**

Altis v4 Keypad shown on Fig 14 is an external keyboard for Altis v4+. It is used to configure main competition settings of Altis v4+ on the airport without a computer. Altis Flight Manager version 4.0.0 or

newer and firmware version 2.0 or higher are required for Altis v4+. F5J firmware support only memory data erase with KeyPad.

In order to use Altis v4+ KeyPad do the following:

- Connect it to COM A port according to Fig 15.
- Configure COM A port to KeyPad mode in the corresponding window shown in Fig 12.
- Turn on Altis v4+, it works in a normal way until there is no KeyPad connected.
- When the KeyPad is connected Altis v4+ 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 v4+.
- Restart your Altis v4+ to use the new settings.



Fig 14: Altis v4 Keypad



Fig 15: Connection of Altis v4 Keypad

## 8. Warning

It is not recommended to supply your whole aircraft via the Altis v4+ 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 v4 on sides.

Do not mount the Altis v4+ device on aircraft components which might be hot in operation (ESC, batteries)!

Do not touch the Altis v4+ 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 v4+ in water, fuel or other liquids!

Before flying with the Altis v4+ always perform a range check!

Do not disconnect the Altis v4+ 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 v4+ 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 v4+ from your PC without using *Safely Remove Hardware and Eject Media* action. This might lead to corruption or loss of any data on device.

## 9. Frequently asked questions and troubleshooting

1. I was updating my Altis v4+ and it does not function anymore. It was OK before.

Probably the process of firmware upgrade was not done in the right way. Connect your Altis v4+ to the computer and wait. In 30 – 150 seconds it should appear on the PC as a disk drive. If the display does not show anything, probably a backup firmware is active and you should run the firmware update again. A new firmware should show its version on the display during its initialization. If there is the new version active, the update has been finished. Otherwise run the update again.

Please follow the instruction on the screen during update.

2. I see the height on the graph increasing to several meters during a test on the ground. Is Altis v4+ 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 v4+. Do not put Altis v4+ near hot objects in your fuselage.

3. My Altis v4+ 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 v4+ 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 $\mu$ s. Best practise is to use throttle output in range 1000us to 2000us

4. When I fly with Altis v4+ and stop the motor, it is not stopped and propeller continues spinning slowly. When I fly without Altis v4+, the motor break runs correctly.

Try to set fixed endpoints on your ESC.

5. In case AFM can not read the flights from the device or Altis v4 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 v4+ disk from AE\_DISK to AE\_DISK1 in *My Computer* folder and restarting the device.

## 10. 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 of fice, 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.

## 11. Product Registration

If you did not purchase the product directly from AerobTec please mail following information to [sales@aerobtec.com](mailto: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>

## 12. Notes

- This manual is based on firmware version 2.0 and Altis Flight manager version 4.0.0
- Information are valid also for regular Altis v4 unless stated otherwise
- Note – Altis v4+ was partially developed using Atollic TrueSTUDIO®

## 13. Revision History

Rev. 1.0. (April 2013)

- Initial release

Rev. 1.1. (July 2013)

- Update because of new screens
- Added frequently asked questions
- Added correct waste disposal
- Minor changes

Rev. 1.2. (December 2014)

- Added Altis v4 KeyPad

Rev. 1.3. (March 2014)

- Added antizoom description, modified firmware upgrade section, and screen types section

Rev. 1.4. (April 2015)

- Added description of new features added with firmware 2.0
- Update because of Altis v4+ device release