



INSTRUCTION MANUAL

The Altitude Motor Switch (AMS) is a versatile device suitable for several competition categories where the altitude or motor run time shall be limited. It can be used also as a standalone telemetric variometer. The sensor is usually connected between the receiver throttle channel and the appropriate signal input of the electronic speed controller.

The AMS contains a sensitive barometric altimeter/variometer which uses the latest MEMS technology to achieve a high level of accuracy, while preserving miniature dimensions. The sensor is able to detect tiny changes in atmospheric pressure to indicate the change of altitude with resolution 0.1m. Using the integrated high power cables you can directly power the receiver and servos through the AMS from a BEC circuit of the speed controller.

FEATURES

- Small dimensions. Possibility to power the receiver and servos through the AMS.
- Accurate measurement of absolute/relative altitude and climb/sink rate.
- Automatic telemetry detection: Duplex EX, Graupner Hott, Multiplex MSB, Futaba S.Bus2.
- Configurable alarms on altitude and climb rate.
- Configurable shutdown altitude.
- Configuration through the transmitter.
- Firmware updates.
- Supported competition categories: FAI F5J, ALES (altitude limited electric soaring), LMR (limited motor runtime) and all possible derivatives.

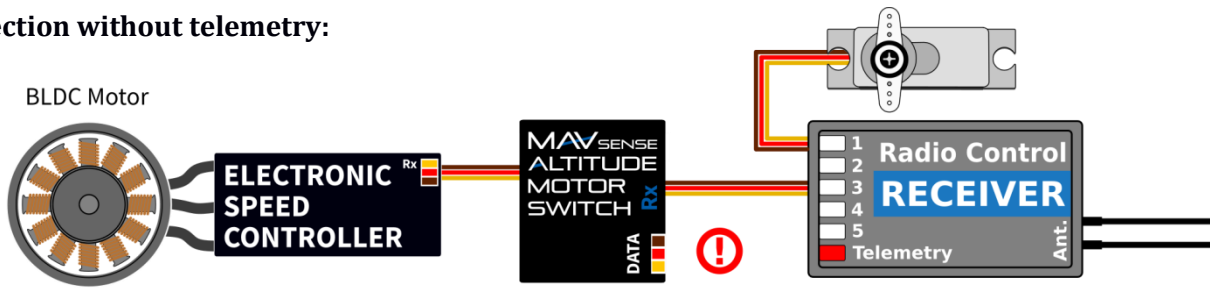
	AMS
Dimensions	27x11x5mm
Weight	7g
Connection	Male/female JR 3x0,5mm ² (3x 20AWG)
Pressure range	300÷1200hPa
Altitude resolution	0.1m
Typical variometer noise ratio	± 0.02m/s
Operating current	15mA
Operating temperature	-20 – 85°C
Supply Voltage	3.5 – 12V
Telemetry	Duplex EX, Multiplex MSB, Graupner Hott, Futaba S.Bus2
Status LED	YES

INSTALLATION

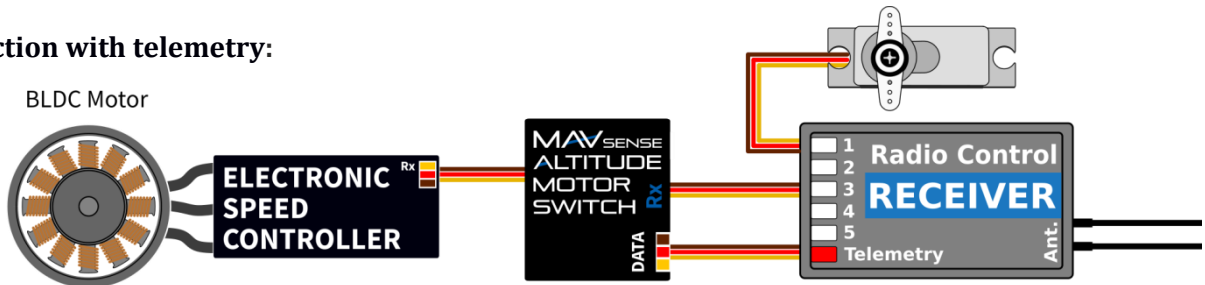
Connect the AMS between the receiver and the electronic speed controller. To control the motor, select the appropriate channel on the receiver. Note that the sensor is very sensitive to changes in atmospheric pressure and also to mechanical stress. Try to avoid any mechanical stress on the sensor. To achieve the most accurate altitude measurement, pay attention to the placement of the sensor. The device should not be exposed to direct airflow and any close contact with heat-emitting objects (e.g. motors or speed controllers) should be avoided.

As an additional function, the telemetry output can be used for setting or wireless data reading. Connect an extension cable with JR connectors between the telemetry port of the receiver and the "Data" port on the sensor.

Connection without telemetry:



Connection with telemetry:



COMPETITION FLIGHT

- Switch on the transmitter and pull the throttle to the off position. The pulse on the throttle channel must be shorter than 1.2 milliseconds.
- Switch on the receiver (e.g. by connecting the flight battery pack).
- The AMS initializes the zero initial height for approx. 3 s after startup, which is indicated by the LED. During this time, it does not accept any commands to start the motor.
- After initialization, the LED turns off and you can fly. After starting the motor (pulse above 1.2ms), the automatic countdown starts. The engine shuts down in any of the following cases:
 - The pilot pulls the throttle below the decision level.
 - The configured motor running time (F5J = 30s) has elapsed after the start.
 - The model exceeds the configured shutdown altitude (altitude limiter mode).
- The engine can be restarted during flight if the appropriate option is configured in the menu. However, if the engine is restarted, all the data from the previous flight are discarded and the AMS shows “---.m” for the rest of the flight. The new flight attempt can be entered after turning the altimeter off and back on.

TELEMETRY AND SETTINGS

The device is compatible with JETIBOX and SMART BOX for programming. The JETIBOX menu is divided into three sections:

- **Actual values** – displays the latest telemetry values (altitude, vario, pressure, temperature) together with minimums and maximums.
 - Reset Min/Max - press left+right buttons together to reset all minimums and maximums.
- **Settings** – basic settings of the sensor
 - **Language** – you can choose the language of the JETIBOX screen.
 - **Device Mode** – select the competition type in a single step:
 - **Vario**, the competition features (altitude/motor switch) are disabled and the sensor acts as a standard telemetry sensor. Motor input is copied to the output without any change.
 - **F5J Logger**, the training mode for F5J category. The sensor limits the motor running time (30s) and records the “Start Height” as defined in the FAI F5J rules. All telemetry functions remain active in this mode. For a competition flight, you need to activate a special F5J firmware with fixed settings and disabled telemetry.

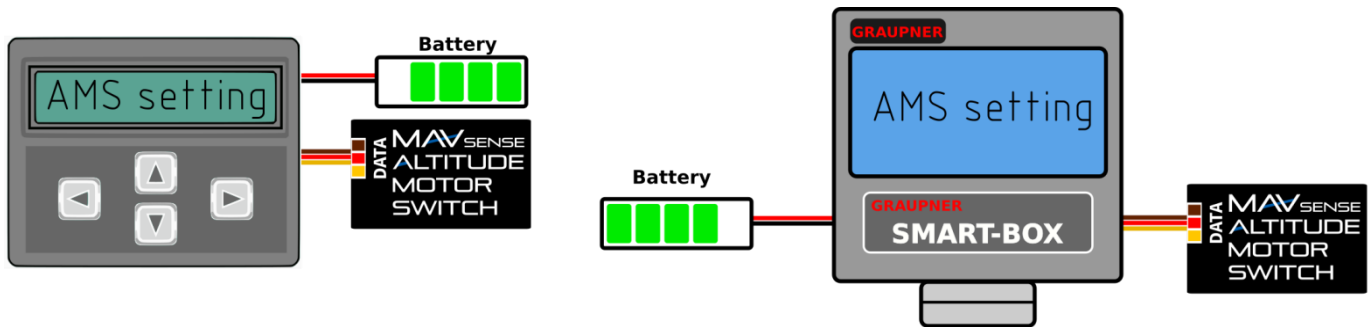
- **ALES Limiter**, the altitude and motor switch functions are both active. You can specify the shutdown altitude and time according to local rules. All telemetry functions remain active and if needed, they may be disabled simply by disconnecting the telemetry cable from the “Data” port.
 - **RC-E7 Limiter** – a competition category that originated in Austria. Shutdown altitude is fixed to 120m and maximum motor time is set to 240s. During this period, the motor can be turned on/off arbitrarily. After 240s it is no longer possible to turn on the motor.
 - **Shutdown Altitude** – specify the cut-off altitude for the motor (ALES only).
 - **Shutdown Time** – specify the maximum running time for the motor (ALES only, F5J applies a fixed value 30s).
 - **Allow Restart** - enabling this option will allow you to turn on the motor more than once during the flight (ALES and F5J training).
 - **Not allow** – motor restart is not possible during the flight. A new flight is available after the power cycle.
 - **Emergency only** – in this case, if you experience a critical situation, such as long distance at low altitude, you can save your model by running the motor and raising the altitude. However, all the recorded flight data (“Start Height” and motor running time) will be discarded.
 - **Auto Reinitialization/8m** – motor restart is allowed if the model altitude is below 8m (26ft). Restarting the motor also immediately reinitiates a new competition flight. This mode is useful in case of training - after landing you are able to start a new round immediately without the need to power cycle the receiver/AMS.
 - **Throttle Idle** – you can set the signal threshold where the motor stops.
 - **Vario Sensitivity** – sets the amount of filtering for the pressure sensor data. By increasing the sensitivity you will get faster response to altitude changes. Please note that the indicated noise may be increased as well. (Default value: Medium)
 - **Sink Rate** – rate of airplane descent when there are no thermal effects. The value of sink rate is added to the climb rate. This will result in locating thermal streams more precisely.
Example: When the model flies at its nominal sink rate 0.5m/s, the vario is silent. As soon as the model enters any thermal upstream, the vario will start beeping (although the airplane may still be descending).
 - **Sealevel Pressure** – the sea level pressure is taken as a reference to calculate the absolute altitude. To get the most accurate calculation of the altitude, set the pressure at your location adjusted to the sea level. The International Standard Atmosphere Model defines the sea level pressure to be 1013hPa (Vario mode only).
 - **Round Altitude** – permits or denies rounding the altitude values displayed on the transmitter. Relative and absolute altitude round to full meters, decimal part is omitted.
 - **Altitude Alarm** – you can set a high altitude alarm. *)
 - **Vario Alarm** – you can set an alarm for excessive climb or sink rate.*)
 - **Alarm Interval** – sets the time period between alarm announcements.
- **Service** – In this menu you can view the device version and reset it to the default factory configuration.
 - **Boot Mode** – allows you to select one of the following firmwares contained in the device:
 - **Default** – firmware with all options unlocked. It can be used for general purpose or training flights.
 - **F5J Contest/F** – a special mode for F5J first-class competition events (typically world championships or World Cup events). Motor restart is not allowed.
 - **F5J Contest/S** – a special mode for F5J second-class competition events (national or local events). Emergency motor restart is enabled. However, the competition flight is invalidated as soon as the motor is restarted.

- **ERES Contest (F3-ERES)** – altitude is limited to the value specified by the pilot. Maximum motor time is set to 30s without possibility of restarting.
- **If you change any kind of settings in the competition firmware, you need to restart the device to correctly perform the next flight with applied settings.**

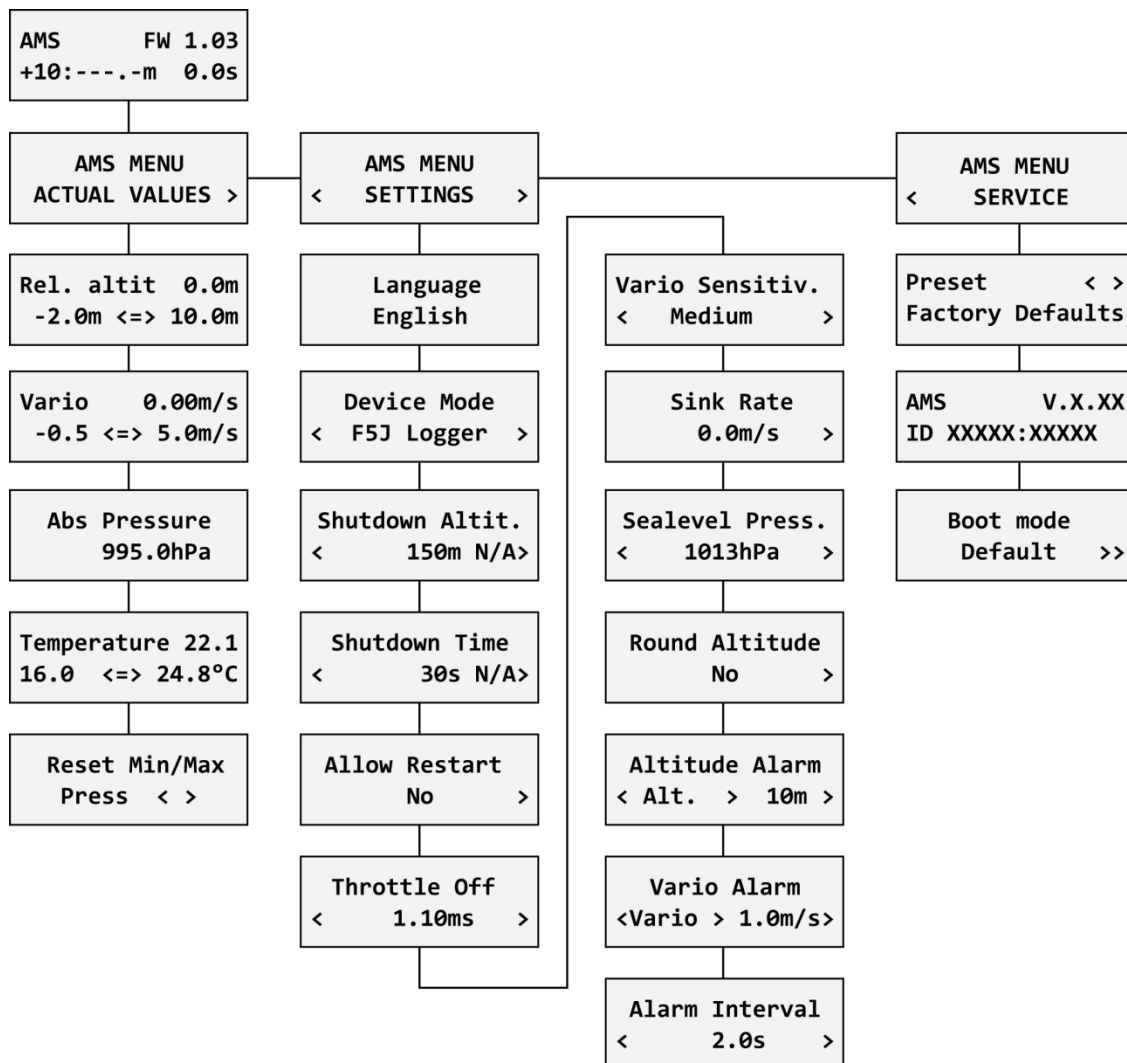
*) The alarm setting is compatible with Duplex and Hott systems.

JETIBOX or SMART BOX Connection

Plug the AMS into the sensor slot of the JETIBOX/SMART-BOX. Power it up using a battery with appropriate voltage (4.5 - 8.4V). Now you can configure the device using the arrows on the JETIBOX/SMART-BOX.

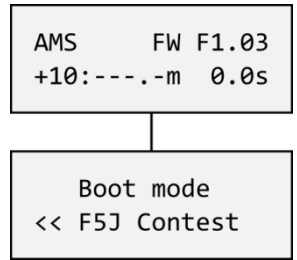


Complete menu structure:

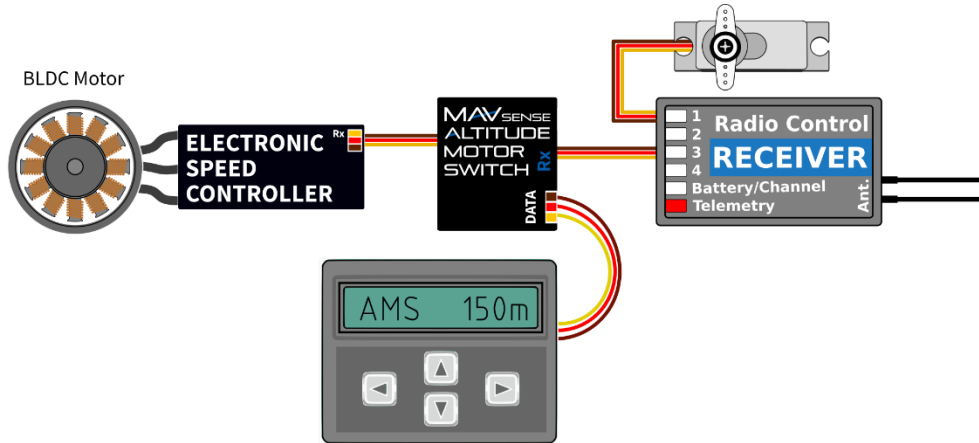


F5J Competition Firmware

The competition firmware shows the version in the “FX.XX” or “SX.XX” format. In the “F” (first-class) version it is not possible to restart the motor. On the contrary, the “S” (second-class) version allows an emergency motor restart. The competition firmware displays the “Start Height” on the second line according to the CIAM FAI specifications. If the empty value “---.” is displayed, no start height has been recorded during the present or last flight. The motor running time is displayed as well.



Within this firmware, the telemetry function is disabled (only JETIBOX and SMART-BOX terminal connections remain active).



You can enter or leave the competition firmware by editing the “Boot mode” parameter. After changing the boot mode, all previously recorded flight data will be discarded and the new setting will be applied after restarting the AMS.

<pre> AMS FW F1.04 +10:---.-m 0.0s Log (9:55) 0:00 0.2m» < Boot mode > <F5J Contest/F > </pre>	<pre> AMS FW S1.04 +10:---.-m 0.0s Log<Off> (9:55) 0:30 142.2m» < Boot mode > <F5J Contest/S > </pre>	<pre> AMS 100m +10:---.-m 0.0s Log<Max> (9:55) 1:25 184.5m» Shutdown Altit < 100m > < Boot mode > <ERES Contest </pre>
AMS F5J First-class competition menu.	AMS F5J Second-class competition menu.	ERES competition menu with configurable altitude.

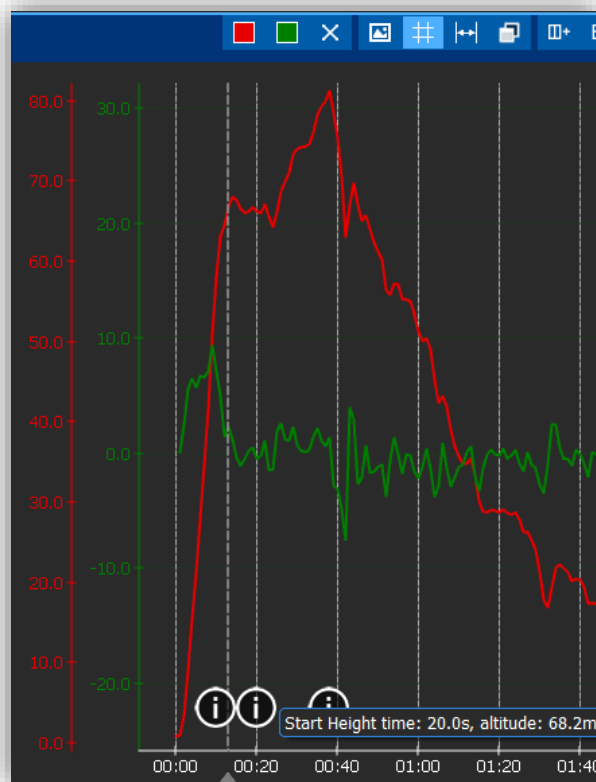
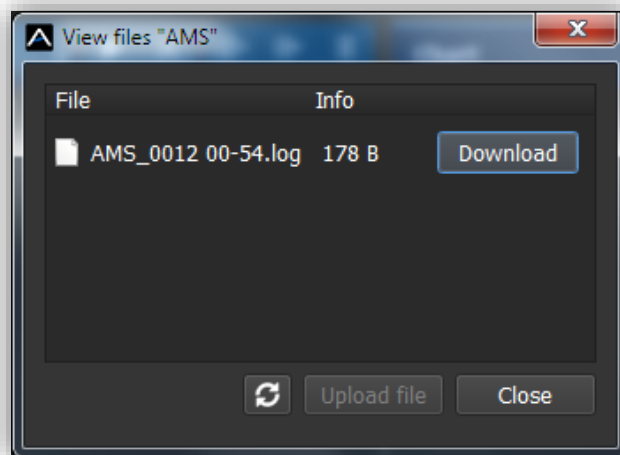
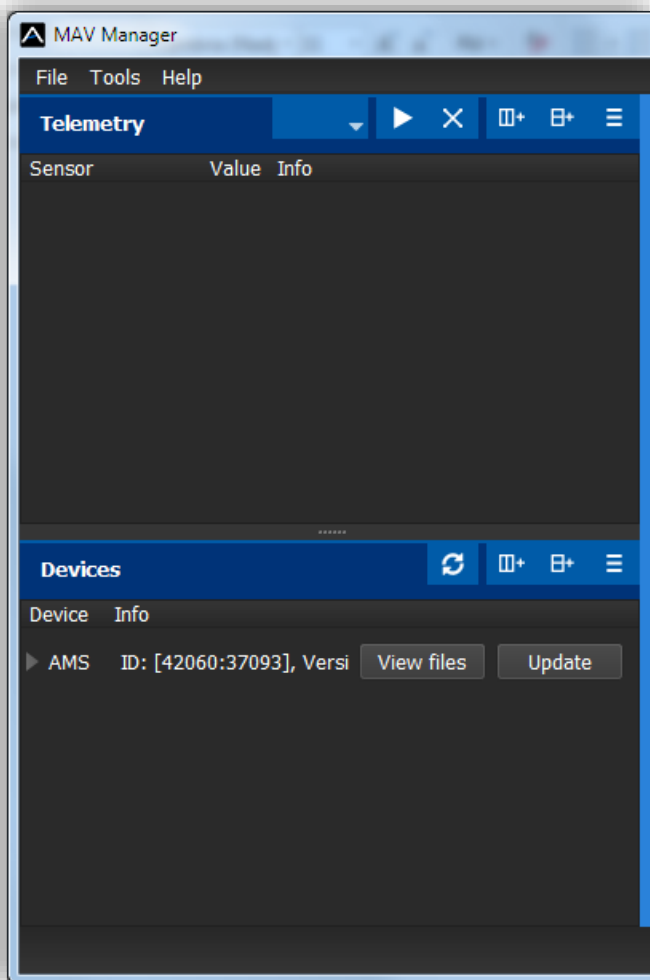
ALTITUDE LOGGING

The logging automatically starts together with the motor and stops once the climb rate is constantly zero and the model lies on the ground. The event of successfully created log file is announced by the transmitter with the status message “Log file created”.

Altitude is stored in 1s interval with resolution 0.1m. The device is able to store up to 16minutes of flight data, which can be later displayed on JETIBOX, SMART BOX or MAV Manager PC software version 1.1.0 or newer.

Additional information is stored in the log file:

- Motor shutdown altitude and time, marked <Off>.
- F5J-defined "Start Height" altitude and time, marked <+10>.
- Maximum reached altitude together with time, marked <Max>.



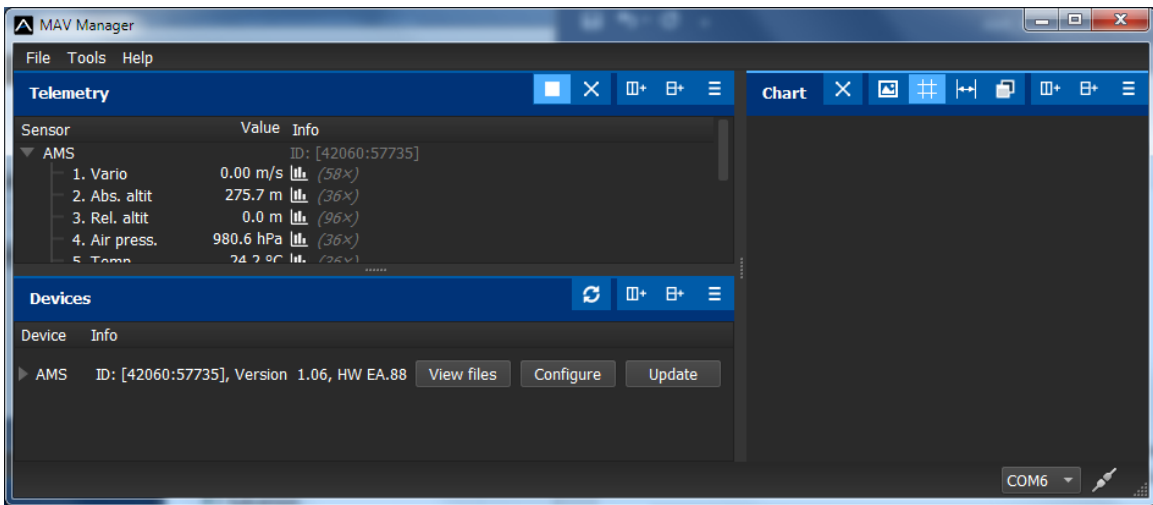
1. Connect the AMS to the PC using USB interface. Once the AMS is detected in the "Devices" window, press the "View files" button.

2. Select the file and press "Download". Only the latest log file is stored within the AMS. After downloading to your PC you'll be able to load the file immediately into MAV Manager.

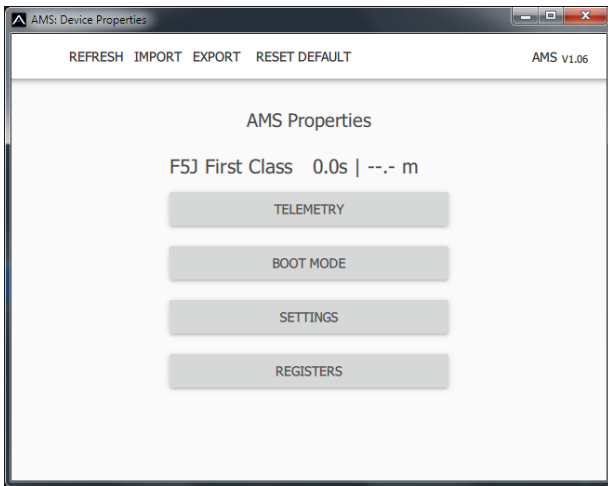
PC CONFIGURATION

It is possible to use the MAV Manager software (1.6.0 and later) to conveniently configure all device settings, display real-time telemetry and make a backup of the configuration. The configuration menu contains four buttons in the top toolbar:

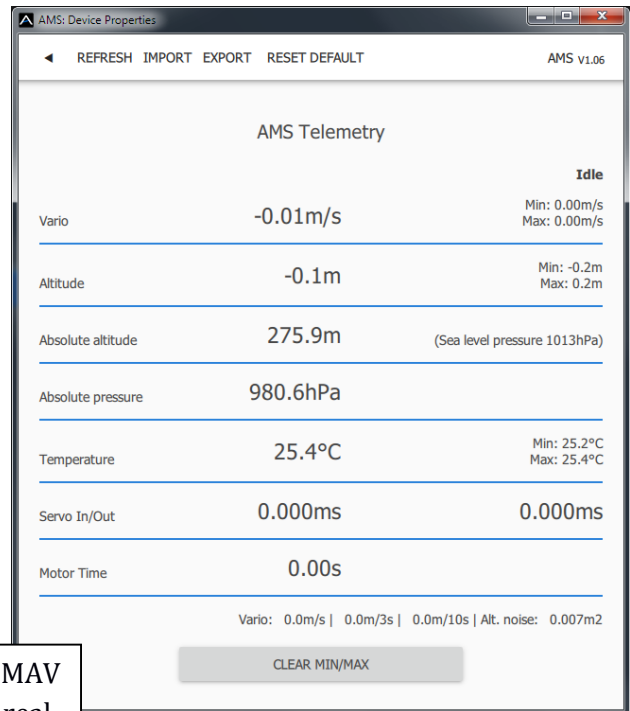
- **Refresh** – forces the configuration to be reloaded from the device.
- **Import** – imports the settings from a file. If you have several devices and want identical settings for all of them, simply import the same settings to each device.
- **Export** – exports the settings from the device to a file. You can easily create a backup configuration stored in your PC. After creating a backup, you may easily experiment with the settings and later revert back to the original configuration by pressing the “Import” button and choosing the original exported file.
- **Reset default** – resets the device to factory defaults and reloads all the settings.



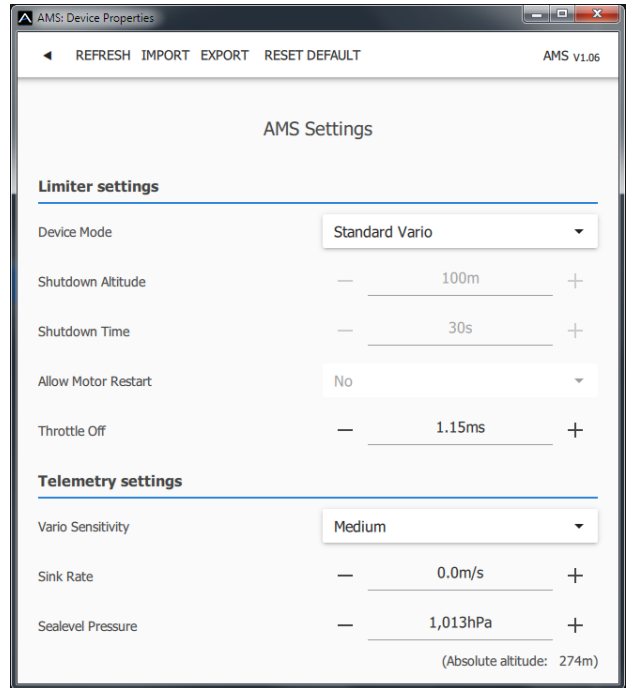
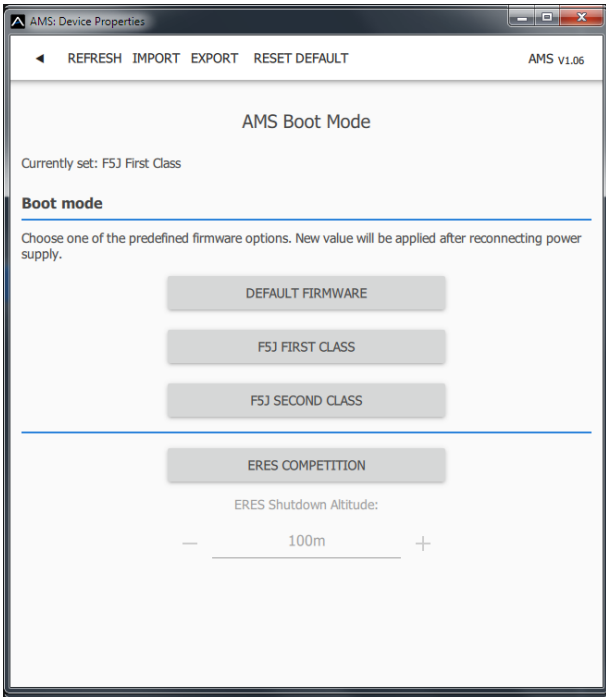
Connect the AMS to your PC using the USB interface. The device will be automatically detected by the MAV Manager. The device properties are available after pressing the “Configure” button.



The initial sensor menu shows the main device mode and links to alter the competition mode or modify the sensor settings.

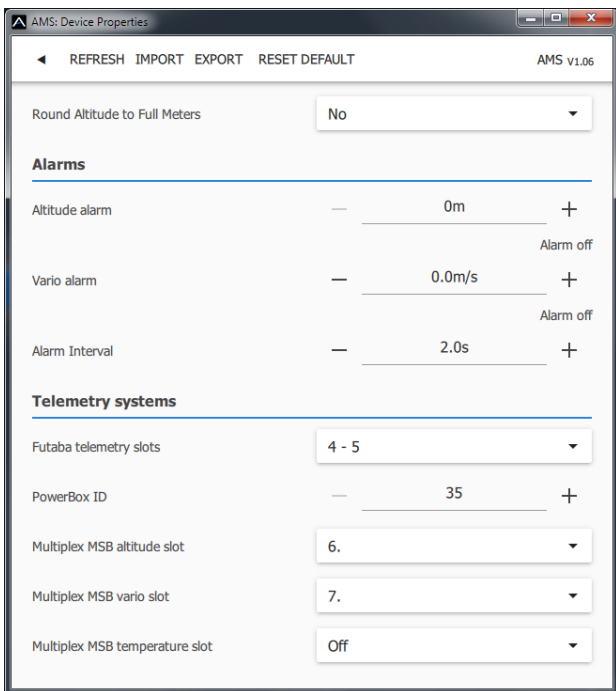


Real-time telemetry with min/max values. The MAV Manager is also able to create a log file from the real-time telemetry data, which can be viewed, analyzed, imported and exported.



Setting competition modes using the “Boot Mode” menu. After confirming the mode change, the AMS must be disconnected from the power supply.

AMS settings. Every time you make any change in the configuration, the new value is immediately transferred to the device and saved to memory. There is no need for additional confirmation.



AMS settings - default firmware. It is also possible to adjust some telemetry parameters.

Graupner Hott Menu Structure:

The AMS offers telemetry as a standard VARIO telemetry module.

AMS	VX.XX
REL. ALTIT	0.0M
VARIO	0.0M/S
AIR PRESS.	995HPA
TEMPERATURE	24°C
>RESET MIN/MAX	
-10/20m	-0.5/5.0m/s
	1/6

AMS	VX.XX
>LANGUAGE:	
	English
DEVICE MODE:	
	F5J Logger
BOOT MODE:	
	Default
	2/6

AMS	VX.XX
>SHUTDOWN ALTIT.:	
N/A	150m
SHUTDOWN TIME:	
N/A	30s
ALLOW RESTART:	
	No
	3/6

AMS	VX.XX
>THROTTLE OFF:	
	1.10ms
VARIO SENSITIV.:	
	Medium
SINK RATE:	
	0.0m/s
	4/6

AMS	VX.XX
>SEALEVEL PRESS.:	
N/A	1013hPa
ALTITUDE ALARM:	
Alt. >	10m
VARIO ALARM:	
Vario >	1.0m/s
	5/6

AMS	VX.XX
>ALARM INTERVAL:	
	2.0s
FACTORY DEFAULTS	
	6/6

SAFETY INFORMATION

- Operate the AMS always in dry environment and within the device limits stated in this guide. Never expose the device to excessive heat or cold.
- Never apply mechanical stress or excessive force to the AMS. The sensing element can be damaged or measure imprecisely if the force is applied.
- Do not remove the heat shrink tube from the device and do not try to implement any changes or modifications. This can lead to a total destruction and to the denial of any warranty claims.
- Always check the polarity of the connection. Never inverse the polarity – this could lead to total destruction.

WARRANTY

We grant a warranty of 24 months from the day of purchase under the assumption that they have been operated in conformity with these instructions at recommended voltages and that they were not damaged mechanically. Warranty and post warranty service is provided by the manufacturer.



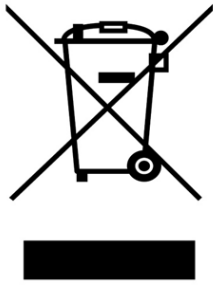
Distributor

GB: ESG-JETI-FIALA UK, B M Jones, 15 London Road, Hassocks, West Sussex, BN6 9NT, United Kingdom.
E-mail: sales@esoaringgadgets.co.uk | Website: www.esoaringgadgets.co.uk | Phone: 44(0)7740181861

Manufacturer

MAV Sense s.r.o., Czech Republic.
E-mail: info@mavsense.com | Website: www.mavsense.com

Information on Disposal for Users of Waste Electrical & Electronic Equipment (private households)



This symbol on the products and/or accompanying documents means that used electrical and electronic products should not be mixed with general household waste.

For proper treatment, recovery and recycling, please take these products to designated collection points, where they will be accepted on a free of charge basis. Alternatively, in some countries you may be able to return your products to your local retailer upon the purchase of an equivalent new product.

Disposing of this product correctly will help to save | valuable resources and prevent any potential negative effects on human health and the environment which could otherwise arise from inappropriate waste handling. Please contact your local authority for further details of your nearest designated collection point.

Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

For business users in the European Union

If you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.

Information on Disposal in other Countries outside the European Union

This symbol is only valid in the European Union.

If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.