

INNOVATION & TECHNOLOGY

Graupner

Manual

HoTT GPS Module

GPS / Vario Modul Alpha

S8437

EN



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Introduction

Thank you very much for choosing a **Graupner GPS VARIO ALPHA MODUL**.

This **Graupner GPS VARIO ALPHA MODUL** is extremely versatile. Read this manual carefully to achieve the best results with your **Graupner GPS VARIO ALPHA MODUL** and first of all to control safely your model. If you experience any trouble during operation, take the instructions to help or ask your dealer or **Graupner Service Centre**.

Due to technical changes, the information may be changed in this manual without prior notice. Be always updated by checking periodically for news on our website, **www.graupner.de**.

This product complies with national and European legal requirements

To maintain this condition and to ensure safe operation, you must read and follow this user manual and the safety notes before using the product!



NOTE


This manual is part of that product. It contains important information concerning operation and handling. Keep these instructions for future reference! Take this into consideration when you pass it on to other future owner.

Service centre

Graupner-Zentralservice

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D-73230 Kirchheim / Teck

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Graupner in Internet For the service centres outside Germany please refer to our web site **www.graupner.de**

Intended use

The **Graupner GPS VARIO ALPHA MODUL** allows wireless control of the position and flight altitude so as the visual and audio indications about the climb or sink rate in real time. The **Graupner GPS VARIO ALPHA MODUL** can be programmed directly with all HoTT transmitters, which have an integrated telemetry menu display.

The **Graupner GPS VARIO ALPHA MODUL** is conceived to be used in remote controlled motors powered by batteries or accumulators, any other use is not permitted. For any improper use no guarantee or liability is assumed.

Read carefully and entirely this manual before you try to use the product.

Graupner constantly works on the development of all products; we reserve the right to change the item, its technology and equipment.

Target group

The item is not a toy. It is not suitable for children under 14. The use of the **Graupner GPS VARIO ALPHA MODUL** should be performed only by experienced modellers. If you do not have sufficient knowledge about dealing with radio-controlled models, please contact an experienced modeller or a model club.

Package content

GPS /VARIO MODUL ALPHA

- ◆ Manual

Symbol description



Always follow the information marked with the **CAUTION** or **WARNING** symbol. The signal word **WARNING** indicates the potential for serious injury, the signal word **CAUTION** indicates potential minor injuries.

The **NOTE** indicates important information that should alert you to potential property damage..

Safety notes



General

These safety instructions are intended not only to protect the product, but also for your own and other people's safety. Therefore please read this section very carefully before using the product!.

Do not leave the packaging material lying around, this could be a dangerous toy for children.

Persons, including children, with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, or not capable to use safely the module must not use the module without supervision or instruction by a responsible person

- ◆ The operation of radio controlled models must be learned! If you have never driven such a model, then start extra carefully and make sure to be familiar with the reactions of the model to the remote control commands. Proceed responsibly.
- ◆ The module should be used only with HoTT components.
- ◆ Pay attention not to overtake the maximum supported voltage. Risk of fire!
- ◆ Protect the module from dust, dirty, humidity and other small parts. Do not expose it to vibrations or to extreme heat or cold. Operating temperature range: -20 to +70°C.
- ◆ The use of the module is allowed only in **non** human-carrying models.
- ◆ Always use all your HoTT components only with the latest firmware version.



Note:

After purchase always check the content for integrity or damages.

Installation in the model

Mount the sensor at an appropriate location in the model. The integrated vario sensor detects changes in air pressure and calculates the resulting actual altitude. Therefore, make sure that the sensor is wind-protected in the model and is not located directly in the flow of the propeller. Likewise, it must not be mounted on an air-tight place, such in a sealed radio box.

The accuracy of the sensor also varies with alterations in ambient air pressure, e.g. due to sudden changes in weather conditions, as well as with changes in air pressure which occur in the course of the day or during an extended flight. It is not uncommon for minor fluctuations in air pressure to affect the accuracy of the sensor to the extent of about 10 to 20 m. These inaccuracies can also be caused by pressure changes inside the fuselage itself (e.g. high pressure due to the forced propeller airflow, or air flowing into the model during a flight).

The GPS module should preferably be mounted under the canopy of the model to receive the data from the GPS satellites without difficulty. The installation in wood or plastic fuselage is no problem, not possible is the installation in carbon fibre fuselage (CFRP), because they shield the GPS signal too much and do not allow reliable operation. The best way to fix the GPS-MODULE with the label facing up with the mounting tabs or double sided tape at an appropriate location in the model is as high up in the fuselage as possible, without any "obstacles" - such as wiring - located over the module, leaves as large an unobstructed angle as possible above the module, so that it can also pick up satellites which are not positioned directly above the model.

By its nature the GPS module can only measure the model's speed accurately when it is flying level over the ground. Fast dives, steep turns and aerobatics cause rapid changes in the angle of the GPS aerial which can cause reception failures on the one hand, or reception of signals from different GPS satellites on the other, either of which can lead to erroneous measurements. If you wish to obtain accurate speed measurements, all you need to do normally is to fly the aircraft level for a period of about one second. However, it can take longer than one second to pick up an unambiguous signal, i.e. to obtain an accurate measurement, if the model is particularly fast, and especially if the machine makes a rapid transition from vertical to level flight.

Start up

Connect the GPS MODULE with the socket marked „T“ of the receiver. The connector system is polarised, look for the small camfer on the edges. Never use force - the plug should engage easily and fully. The sockets are labelled accordingly: black wire (-), red wire (+) and orange wire (T).

Only for transmitters with SMART-BOX:

Install the SMART-BOX at the mounting bracket of the transmitter as shown in the figure. Connect the box then the 3-pin lead to the transmitter. Put one end of the cable into the DATA jack on the transmitter and the other into the jack on the right side of the SMART-BOX. The connector system is polarised, look for the small camfer on the edges. Never use force - the plug should engage easily and fully. The sockets are labelled accordingly: black wire (-), red wire (+) and orange wire (T).



Note:

You can connect the GPS MODULE instead of the receiver directly to the jack on the right side of the SMART-BOX. By doing this, the settings will be sent directly to the GPS MODULE (without using the radio control system) and the programming is much faster. A power supply for the SMART-BOX is necessary (3.6 - 9 V), inserted on the left side. The connector system is reverse polarised, look for the small camfer on the edges. Do not use force, the plug should click into place easily. This sockets is labelled accordingly also. The black wire must be down (-), the red top (+).

Operation

The operation of the GPS-MODULE is similar to the operation of the transmitter. You should also read the manual of your remote control system, especially the chapter „telemetry“. The operation is done in the transmitter menu „Telemetry“ under the display SETTING AND DATA VIEW. The sensor displays follow the receiver displays (RX), i.e. the „GPS Sensor“ display follows after the last display servo test (RX SERVO TEST).

Please note: the menus can only be selected when the receiver is switched on. When you switch the receiver on, it may take a few seconds before the receiver display becomes active and can be selected symbol appears at the top right corner of the transmitter display (TX).

There may be a slight delay in the screen's response to inputs, since all the settings are transmitted directly to the receiver by wireless means.

Operation with the SMART-BOX

The SMART-BOX is operated by the four buttons on the top. Switch with the ESC and ENTER keys between the different displays. With the DEC and INC buttons you can select the parameters in the display (INC moves the cursor down, DEC up).

Switch on the transmitter. On the startup screen appears SETTING AND DATA VIEW / MODEL SELECT.

Move the arrow cursor with the INC or DEC buttons on SETTING AND DATA VIEW and then press ENTER to display the parameters of the transmitter, receiver and telemetry sensors and / or program it, or select MODEL SELECT to display the telemetry data graphically. In MODEL SELECT display no changes are possible.

After SETTING AND DATA VIEW have chosen, the GPS SENSOR display is available. The sensor displays follow the transmitter (TX) and receiver (RX) displays, i.e. the GPS display follows after the last display servo test (RX SERVO TEST).

Please note: the menus can only be selected when the receiver is switched on. When you switch the receiver on, it may take a few seconds before the receiver display becomes active and can be selected: > symbol appears at the top right corner of the transmitter display (TX).

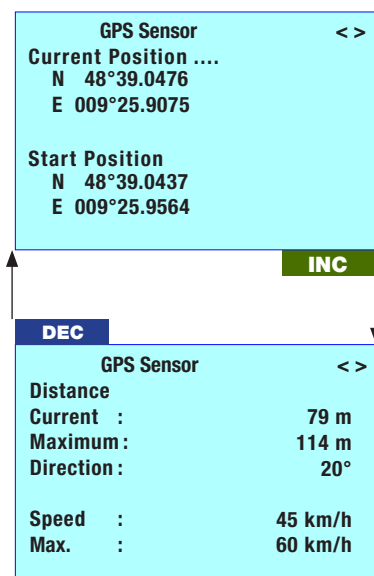
There may be a slight delay in the screen's response to inputs using the top buttons, since all the settings are transmitted directly to the receiver by wireless means.

GPS menu (GPS SENSOR)

Please note: the labelling of the arrows of the following displays corresponds to the keys on top of the SMART-BOX. This assignment is different depending on the remote control system:

SMART-BOX	mx-12/16/20/32 HoTT	mc-19/mc-22/mc-24/mx-24 HoTT
ENTER	▶	ENTER
ESC	◀	CLEAR
INC	<i>scroll: ▼ value: ▲</i>	<i>scroll: push</i> Rotary + ↻ <i>value:</i> Rotary ↻
DEC	<i>scroll: ▲ value: ▼</i>	<i>scroll: push</i> Rotary + ↻ <i>value:</i> Rotary ↻
INC+DEC	SET	push Rotary

The descriptive text describes also primarily the button layout and operation of the SMART-BOX, followed by the buttons of the mx-16 HoTT (No. 33116) as an example in parentheses. Please note that the button layout for example of the HoTT mc-transmitters (No. 4758, 4759) may differ. Read the manual of your remote control system to become familiar with the telemetry operation.



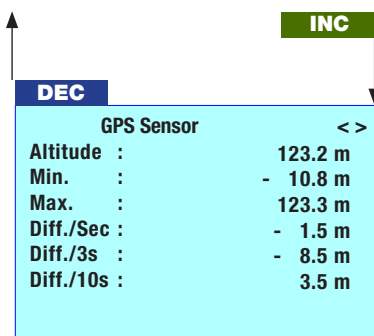
In the first row the climb-/sink rate in meter per second is displayed on demand in synchronization with the warning tones alternating with „GPS sensor“, the vertical speed in meters per second. Sinking is represented by the negative sign.

Parameters which have various setting options in the column Setup, can be modified. If these options are missing, the parameter data are displayed only.

Note: After switching on the GPS module shows under ‚Current Position‘ the last position. If the current position is determined (a short melody sounds), it is showed under ‚Starting position‘ - this process can take several minutes, depending on reception quality of the GPS signal.

The GPS module is now ready for use.

The GPS module is set to the level 0 m after switching on. The altitude displayed is not the absolute altitude above sea level, but the relative height from the base!



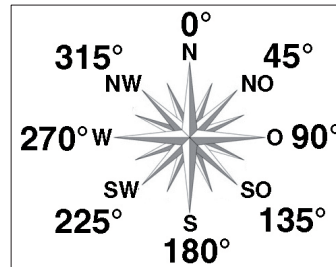
Parameter	Description	Setup
Current Position	Current position latitude/longitude	-
Start Position	Position after switching on the GPS module	-
Current Distance	Current distance to start position in meter	-
Maximum Distance	Maximum distance to start position in meter	-
Direction	Direction of the model in degrees	-
Speed	Current speed of the model in km per hour	-
Max. Speed	Maximum speed of the model in km per hour since the start	-
Altitude	Current Altitude (Meter)	-
Min.	Minimum Altitude since the start (Meter)	-
Max.	Maximum Altitude since the start (Meter)	-
Diff. / Sec	Climb-Sink rate (Meter per sec.) - sinking is displayed with neg. sign	-
Diff. / 3s	Climb-Sink rate (Meter per 3 sec.) - sinking is displayed with neg. sign	-
Diff. / 10s	Climb-Sink rate (Meter per 10 sec.) - sinking is displayed with neg. sign	-

Current Distance

Shows the current distance of the model based on the Starting Position.

Direction

Shows the current direction of the model based on the cardinal direction. The directions are displayed in degrees:



North: 0°, East: 90°, South: 180° and West: 270° (see pic.):

Note: the direction is correctly displayed from a speed of about 10-15 km / h or higher, if the model is moving slower, the value is inaccurate.

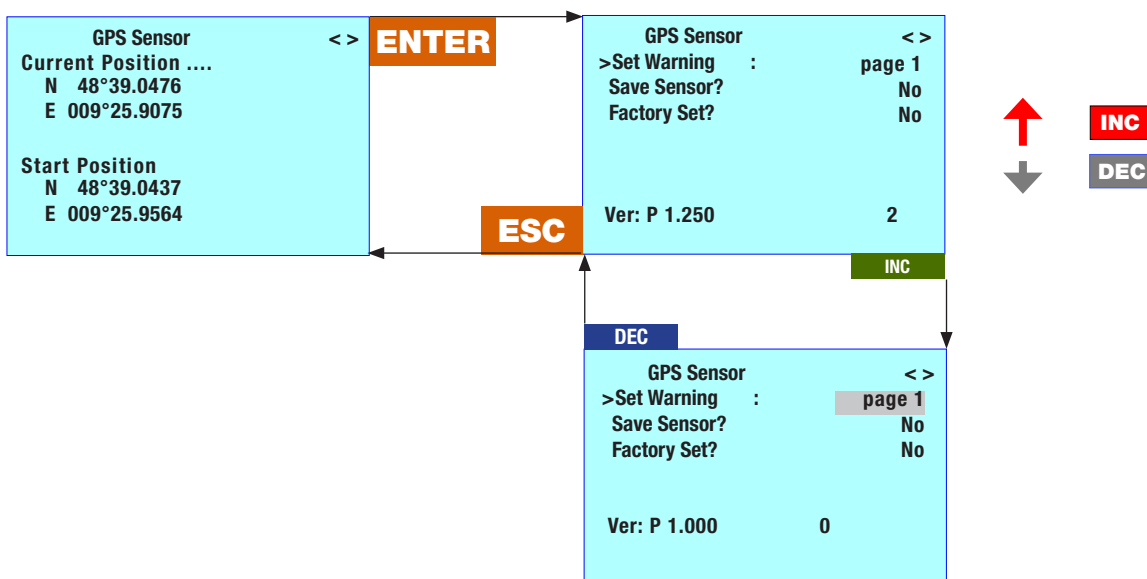
Speed

Shows the current speed of the model. Maximum speed that can be displayed is 999 km/h.

Max. Speed

Shows the maximum speed of the model since the start. Maximum speed that can be displayed is 999 km/h.

Programming - Setting the alarm thresholds



If you wish to carry out an adjustment, you must use the INC or DEC buttons above the screen to select the desired parameter (e.g. page 2) by moving the arrow cursor (INC moves the cursor down, DEC moves it up). Simultaneously pressing the INC and DEC (SET) buttons switches the parameter to be adjusted to inverse video (white on black); this indicates that it can be programmed: pressing the INC button at this point increases the value, pressing the DEC button reduces the value. When the adjustment is complete, save the selected setting by pressing the INC and DEC (SET) buttons simultaneously; the dark background now disappears in order to confirm this action.

Parameter	Display-page	Description	Setup
Set Warning	Page 1 – page 10	Parameter Display	Page 1 – page 10
Max. Distance	Page 2	Maximum distance in meter	0 to 3000 m
Min. Speed	Page 3	Minimale speed in km/h	0 to 999 km/h
Max. Speed	Page 4	Maximum speed in km/h	0 to 999 km/h
Min. ALT	Page 5	Minimum altitude	- 500 to 3000 m
Max. ALT	Page 6	Maximum altitude	- 500 to 3000 m
Negative Difference 1 (Sek.)	Page 7	Sink rate / Sec.	- 50.0 to 0 m
Negative Difference 2 (3 Sek.)	Page 8	Sink rate / 3 Sec.	- 50.0 to 0 m
Positive Difference 1 (Sek.)	Page 9	Climb rate / Sec.	0 to 50.0 m
Positive Difference 2 (3 Sek.)	Page 10	Climb rate / 3 Sec.	0 to 50.0 m
Warning Time	Page 2 – page 10	Alarm time	OFF, 5, 10, 15, 20, 25, 30 sec.
Repeat Time	Page 2 – page 10	Repeat time	Always, 1, 2, 3, 4, 5 Minutes, One Time
Signal Tone	Page 2 – page 10	Signal tone	A - Z
Save Sensor	Page 1	Save the setting in the sensor (GPS-MODULE)	YES / NO
Factory Set	Page 1	Reset to factory settings	YES / NO

Display (Set Warning Page 1)

Shows the various “display pages“ with the possible adjustable parameters and the associated adjustable warning thresholds

(page 1, page 2, etc.). To switch between pages, press the INC or DEC key.

Factory Set

Choosing “YES“, will reset the settings of the variable module to factory settings.

The following parameters can be set separately for all displays:

Warning Time

Sets whether and how long the warning signal is activated when reaching a certain value for each display screen.

Repeat Time

Sets how often the warning signal is activated when reaching a certain value for each display screen.

Signal Tone

Sets the signal tone melody. The warning sounds are combined with the warnings on the display and the voice output. The signal tone A-Z are connected to the language selection. Therefore, they may not be changed.

When a warning is activated, the corresponding message (eg. Min. Height) is shown inverted in the first row of the associated display, which then appears alternately with the display GPS SENSOR and the selected Signal Tone A - Z sounds.

You can stop the warning at any time by pressing one of the buttons on the top of the SMARTBOX.

Settings saving

To save the settings in the GPS Module, go back to the menu “page 1 - GPS Sensor“ and select the menu point “Save Sensor“. Pushing the “SET“ button switches the parameter to inverse video (white on black) . Push the INC button at this point to increase the value to YES and push the “SET“ to save the selected value, the dark background now disappears in order to confirm this action.

If you do not want to save the adjustments, select NO.



Attention

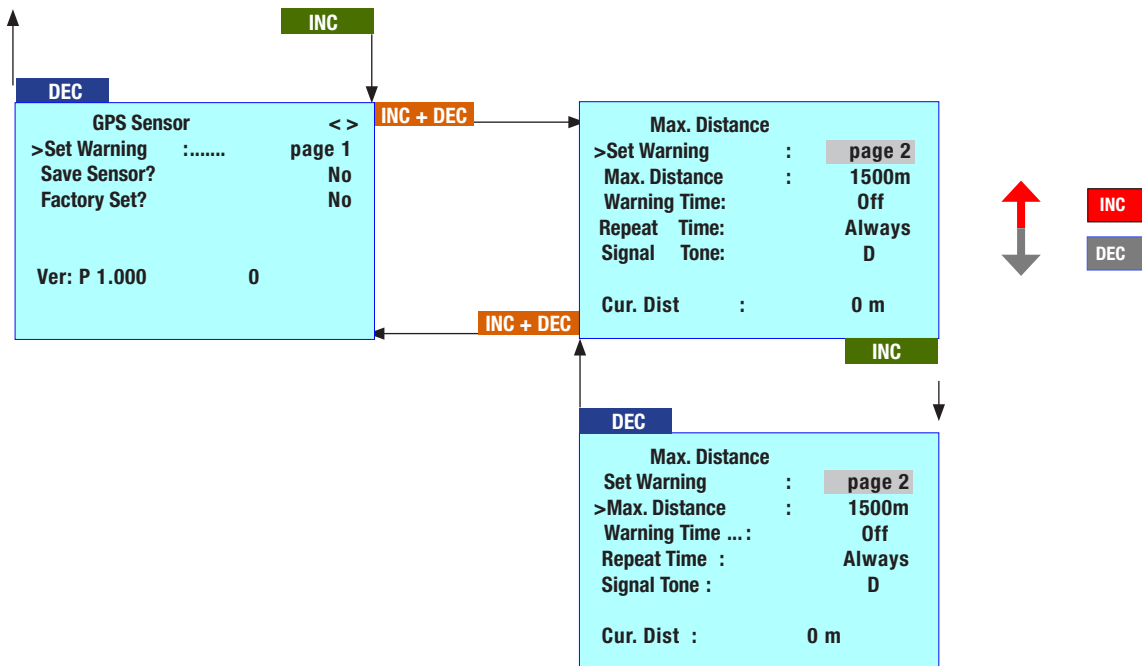
Do not carry out any programming work on the sensors while the model is flying, otherwise there is a real risk that your model will fly out of control while you are not concentrating on it! If your model is fitted with two or more receivers, it is absolutely essential that you do not carry out programming work during a flight, as this can alter the settings in the receivers to which no telemetry equipment is connected; in the worst case this could result in the model crashing.

For this reason always carry out programming on the ground, and check that only the receiver with connected sensors is powered on.

Maximum distance (Page 2)

Maximum Distance: Maximum distance of the model during operation, warning threshold set between 0 and 3000 m (based on the starting position)

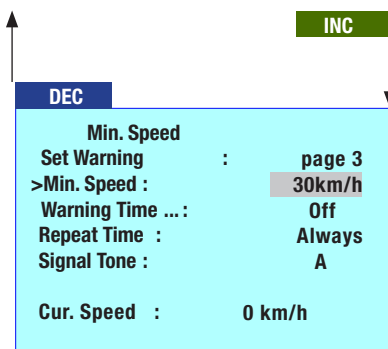
Factory setting: 1500 m, Signal Tone: D

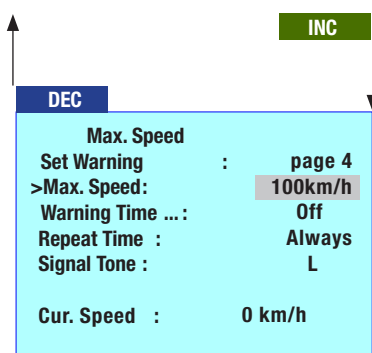


Minimum speed (Page 3)

Minimum Speed: minimum speed of the model during operation, warning threshold set between 0 and 200 km/h (1 km/h steps)

Factory setting: 30 km/h, Signal Tone: A

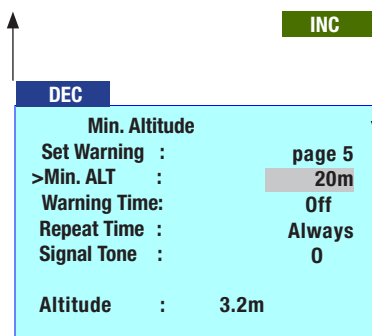




Maximum speed (Page 4)

Maximum Speed: maximum speed of the model during operation, warning threshold set between 0 and 200 km/h (1 km/h steps)

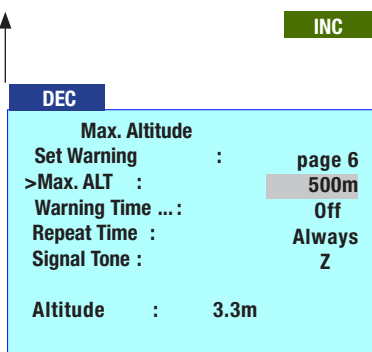
Factory setting: 100 km/h, Signal Tone: L



Minimum altitude (Page 5)

Minimum altitude of the model during operation, warning threshold set between -500 and +3000 m (based on the starting altitude 0 m)

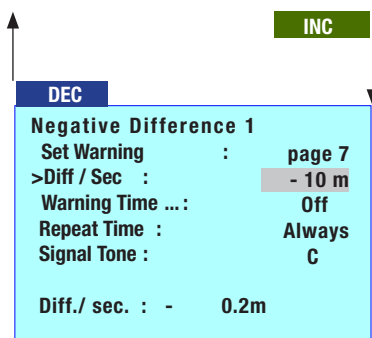
Factory setting: 20 m, Signal Tone: 0



Maximum altitude (Page 6)

Maximum Altitude: Maximum altitude of the model during operation, warning threshold set between -500 and +3000 m (based on the starting altitude 0 m)

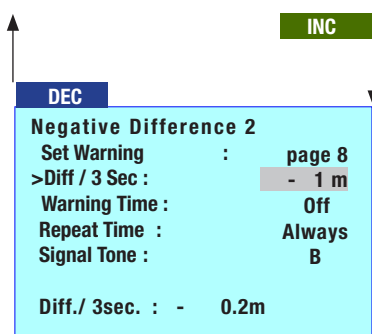
Factory setting: 500 m, Signal Tone: Z



Sink rate per second (Page 7)

Sink rate/s (Negative Difference 1): Sink rate of the model per sec. in Meter, warning threshold set between -50 and 0 m (based on the starting altitude 0 m)

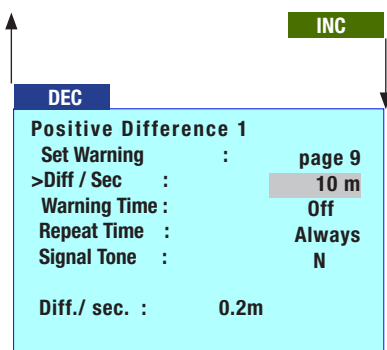
Factory setting: 10 m/Sec., Signal Tone: C



Sink rate per 3 seconds (Page 8)

Sink rate/3 s (Negative Difference 2): Sink rate of the model per 3 sec. in Meter, warning threshold set between -50 and 0 m (based on the starting altitude 0 m)

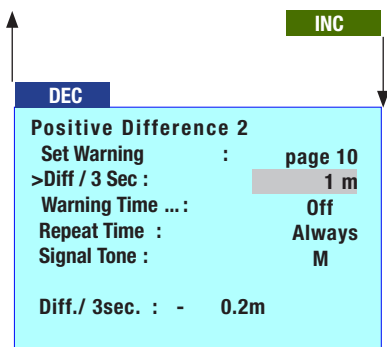
Factory setting: 1 m/3 Sec., Signal Tone: B



Climb rate per second (Page 9)

Climb rate/s (Positive Difference 1): Climb rate of the model per sec. in Meter, warning threshold set between 0 and 50 m (based on the starting altitude 0 m)

Factory setting: 10 m/Sec., Signal Tone: N



Climb rate per 3 seconds (Page 10)

Climb rate/3 s (Positive Difference 2): Climb rate of the model per 3 sec. in Meter, warning threshold set between 0 and 50 m (based on the starting altitude 0 m)

Factory setting: 1 m/3 Sec., Signal Tone: M

Setup displays

Continuous vario

The module provides two vario functions:

1. Continuous vario

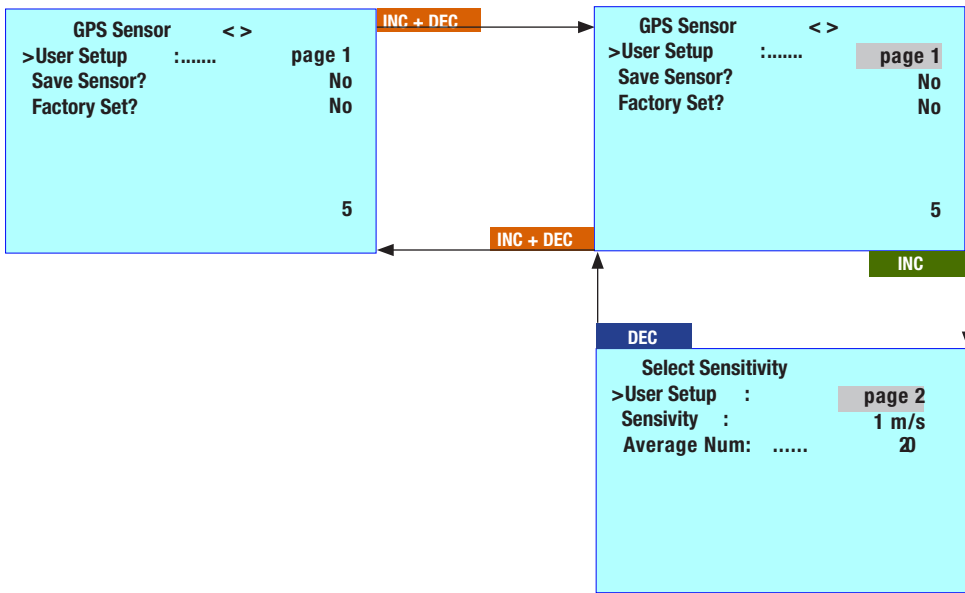
is automatically launched when the menu telemetry VOICE TRIGGER, VARIO is a switch has been set and then the graphical display of the ELECTRIC AIR MODULE is activated. This function CONTINUOUS VARIO shows the climb or descent of the model permanently by rising or falling beeps.

2. Sensitivity Vario (only with the modules M-G1/M-G2, mx-12/16 order No. 4754/4755 or mc-19/22 HoTT 4758/4759) - output only trough modules buzzer

The climb or descent rate is predetermined by the parameter sensitivity (SENSITIVITY). The sensitivity must be programmed before operation. You can choose between: (OFF), 0.5 m / sec 3, 1 m / 3 s, 0.5 m / sec., 1 m / sec. or 3 m / sec. Factory setting is 1 m / sec. You should use one of these at the same time!

Sensitivity setup

Select the User Setup display as shown in the diagram. Press the INC and DEC buttons on the SMART-BOX (resp. SET) simultaneously and select User Setup page 2. To save the selected settings, go back to page 1 and choose ,Save Sensor, YES.



Parameter	Description	Setup
User Setup	User setup	1 - 4 (page)
Save Sensor	Save the setting in the sensor (GPS-MODULE)	YES / NO
Factory Set	Reset to factory settings	YES / NO
Sensitivity	Sensitivity - Continuous Vario	OFF, 0.5m/3 sec.; 1 m/3 sec.; 0.5 m/sec.; 1m/Sec. or 3.0 m/sec. Factory setting 1 m/Sec.
Average Number	Number of measurements of the sensor per Sec.	4 - 40 Factory setting: 20

The number in the menu on page 1 down right shows the number of the value saved which have been saved in the module.

SENSITIVITY (Page 2)

Select the climb or sink rate at which the Beep is activated. Climbing is indicated by a high tone, sinking by a deep tone. The higher / lower the tone sounds, the greater/ smaller is the climb or sink rate.

Note: when SENSITIVITY is set to OFF, no beeps or voice announcements will be displayed.

The actual climb or descent rate is displayed in the Vario screen alternately in the top row. This display responds faster than the "Diff."- information the display below, so the values can differ.

Altitude level Beep

when the following altitudes (starting from the starting altitude 0 m) are reached, the following tones will sound:

20 / 40 / 60 / 80 / 100 m: low tone once (20 m) up to five times (100 m)

200 / 400 / 650 / 800 / 1000 m: high tone once (200 m) up to five times (1000 m)

AVERAGE NUMBER (Page 2)

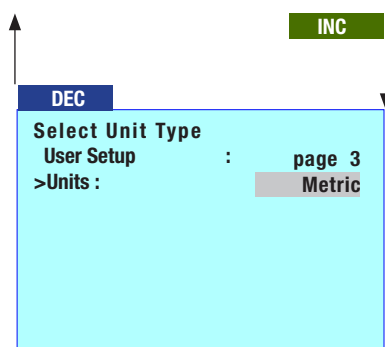
Number of measurements per second, is used to adjust the accuracy of the sensor.

More measurements increase the accuracy, while fewer measurements increase display speed.

Recommendation:

Sensitivity 0.5 m: approx. 20 measurements per Sec.

Sensitivity 1 m: approx. 4 measurements per Sec

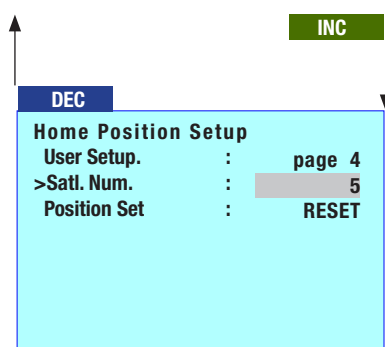


Select Unit Type (Page 3)

Select the unit used for measurement - metric or English

Metric = m/Meter

English = ft/Foot



Home Position Setup (Page 4)

Satl.Num.

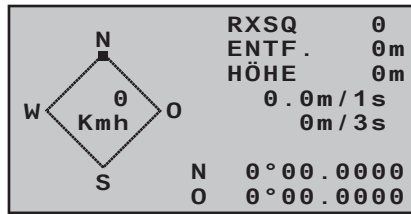
Minimum number of satellites. Only after that the GPS module has received the signal from the selected number of satellites then the distance display will be set to zero and the GPS coordinates will be shown in the telemetry display.

Position Set

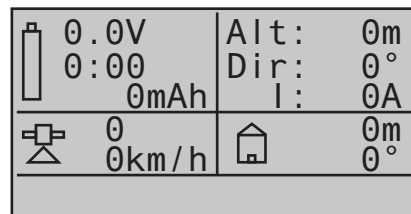
If you select here "RESET", then the GPS position will be determined and the distance display will be set to zero.

Telemetry display

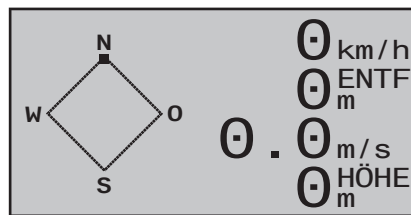
In your HoTT transmitter display the following images can be shown. The data in Volt and Ampere display in the second image appear only if other corresponding modules are connected.



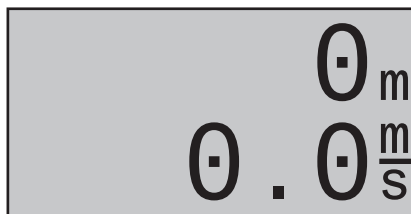
RXSQ - Downlink channel signal strength
DIS. - Distance
ALT - Current altitude related to launch
m/1s - Climb/Sink
m/3s Climb/Sink
Kmh - Speed



O - Number of satellites
0km/h - Speed
Alt - Current altitude related to launch
Dir - Direction
0m - Distance
° - Angle from launch point



0km/h - Speed
DIS. - Distance
m/s Climb/Sink
ALT - Current altitude related to launch



This display shows the data about altitude in meters related to launch so as the the current climb/sink rate in m/s, from the vario integrated in the GPS/ Vario module (No. 33600) .



In base on the related sensors this display shows the current speed on the ground.

Firmware update



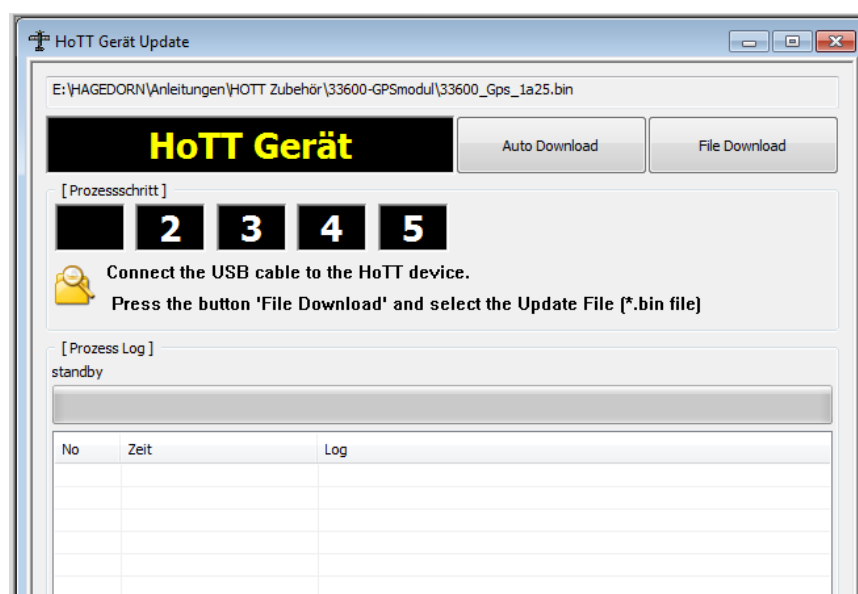
The update possibility by the user holds the **Graupner GPS VARIO ALPHA MODUL** always to the newest stand and ensures the possibility of future functions.

General preparation

For the update you need a Windows PC and the “Firmware Upgrade Studio” firmware. You can download it from our web site. Visit the Update und Revisions Historie in our web site homepage and click on GPS Modul S8437. At the point **Downloads** you can find all the necessary data. After the download these .zip files must be extracted.

1. USB drivers installed? (The drivers are in the software packet “HoTT_PC_Software”)
2. Select COM Port
3. Start the “HoTT Gerät” program:

Start the “HoTT Gerät” program in the program group “Gerät”. (Alternatively select in “menu” the related entry.)



- ◆ Required accessories:
- ◆ USB interface for Graupner/GM-GENIUS 7168.6
- ◆ 7168.S USB adapter lead

Connect the adapter lead No.7168.6 to the USB interface and connect the usb cable to your PC. A red LED should light on the usb interface adapter, otherwise check step (1.). (The LED quits automatically after a period depending on the OS).

Do not connect yet the 3 poles plug of the adapter lead No. 7168.S to the GPS module.

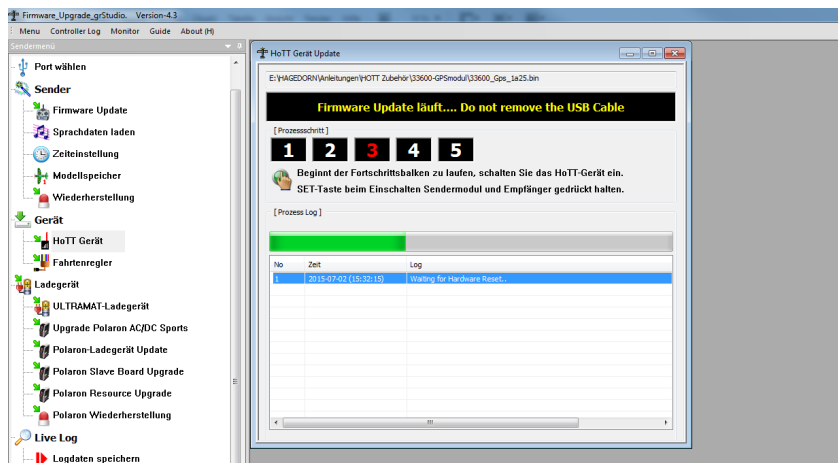
Then you have two possibilities to update the firmware: “Auto download” or “File download”.

Auto download

If you want to load automatically the current firmware on the GPS module then use the automatic option.

The program will then automatically try to download the current firmware from the Net.

Immediately after clicking on the button, the bar starts to become



green. Before the bar is filled, insert the adapter lead in the GPS module. Another dialogue window opens in which you have to select the desired firmware by clicking the “Open file” button. Then, the application downloads the file and transfers it to the GPS module.

File download

If you want to transfer a special firmware on the GPS module, use the “File download” option. In then opened dialogue window select the previously downloaded file, then the green bar starts to fill. Before the bar is filled, insert the adapter lead in the GPS module. The application then transfers the firmware.

Please refer to the detailed update instructions for the HoTT components in the Download area at www.graupner.de.



S8437 GPS Vario Modul Alpha

Graupner declares that the product is conform to EU norms.

EMV 2004/108/EC: EN 61000-6-1; EN 61000-6-3

Notes for environmental protection



Disposal notes

The symbol on this product, its operating instructions or packaging gives notice that this product may not be discarded as common household waste at the end of its service life. It must be turned over to a recycling collection point for electric and electronic apparatus.

The materials can be recycled according to their markings. You make an important contribution to protection of the environment by utilizing facilities for reuse, material recycling or other means of exploiting obsolete equipment.

Batteries must be removed from the unit and disposed of separately at an appropriate collection point. Please inquire with local authorities about the responsible waste collection locations.

Care and maintenance



Notes on care

The product does not need any maintenance, it works so as it is without any special care. In your own interest please protect the model from dust, dirt and humidity!

Clean the product only with a dry cloth (do not use detergent!) lightly rub.

Warranty certificate

The **Graupner**, Henriettenstrasse 96, 73230 Kirchheim/Teck grants from the date of purchase of this product for a period of 24 months. The warranty applies only to the material or operational defects already existing when you purchased the item.

Damage due to wear, overloading, incorrect accessories or improper handling are excluded from the guarantee. The legal rights and claims are not affected by this guarantee. Please check exactly defects before a claim or send the product, because we have to ask you to pay shipping costs if the item is free from defects.

The present construction or user manual is for informational purposes only and may be changed without prior notice. The current version can be found on the Internet at www.graupner.de on the relevant product page. In addition, the company **Graupner** has no responsibility or liability for any errors or inaccuracies that may appear in construction or operation manuals.

No liability can be accepted for printing errors.

