

FLYMASTER

VARIO *m*



User Manual
v.1.0

IMPORTANT

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Tech Specs

Display Type.....Grayscale: 320x240px

Battery Capacity (Lithium-Ion)..... 1800mAh

Autonomy.....Usually +35 hours (environment conditions may alter this value)

Pressure Sensor.....High resolution barometric sensor 10 – 1200 mbar

Audio.....On board piezo system for vario and alerts

Microprocessor.....Microprocessor with proprietary RTOS

Native USB Type C Connection.....Allows connection to the PC

Battery Charging.....From wall adapter or standard usb port

Firmware update by USB (upgrades are free)

Size.....152x90x18 mm

Weight.....180g

Overview



First Steps

1.

We recommend the reading of the following documents:

- Warranty terms and conditions.
- Complete user manual of your instrument.

To do that, please use the following links:

https://dnl.flymaster.net/Flymaster_Standard_Limited_Warranty_EN.pdf
<https://www.flymaster.net/downloads>

2.

Create a Flymaster Cloud account if you don't already have one.

After the account creation go to:

<https://livetrack360.com/login>

3.

Register the instrument in your account.

<https://livetrack360.com/devices/register>

4.

Install "Flymaster Instrument Manager" to manage your Vario M or GPS M.

F.I.M. will allow you to send new airspaces to the instrument, sending waypoints, building page layouts, update firmware, sync to Flymaster Cloud Flights, etc.

<https://www.flymaster.net/downloads>

Reset and “recovery mode”

Hardware Reset



If for some reason your instrument becomes unresponsive you can force a reset to force his reboot.

Press the power together with the menu/esc button at the same time for 2 or 3 seconds and release.

After releasing the buttons, the instrument should reboot.

Enter “recovery mode”



If for some reason your instrument does not start and keeps rebooting without any apparent reason, it's possible to put it in “recovery mode” so the firmware can be restored via Flymaster Instrument Manager.

Check the Youtube video link bellow, that explains how to do it.



<https://youtu.be/YMSvr8MNkMc>



Charging and battery management

Flymaster VARIO M has an advanced battery power management system, which gives the pilot accurate information about the battery state, as well as the charging time and battery remaining time.

To charge the Flymaster VARIO M battery we recommend the usage of the supplied wall charger and USB cable via USB Type-C port.

Original Flymaster accessories are recommended in order to avoid damage to the power management system.

Charging, and battery status information is shown on both the power up screen and the settings info page.

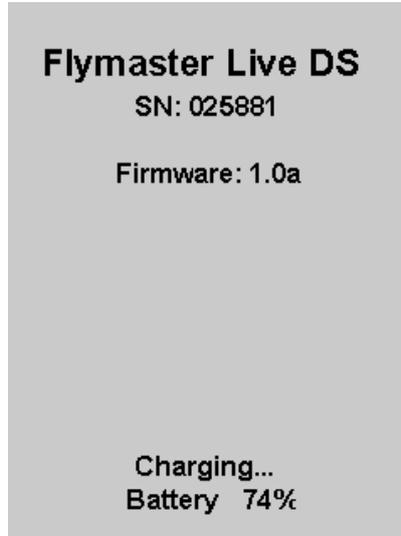
When Flymaster VARIO M is connected to a power supply (wall charger or via USB cable), the instrument will show the time remaining to full charge.

Use the supplied wall power supply to fully charge the instrument.

Note: Charging the instrument with high ambient temperatures should be avoided. Such action can cause the battery to overheat and affect the battery health.



Check battery status



VARIO M is charging turned off



VARIO M is charging turned on

Go to Menu -> Device settings

- Battery – Actual battery percentage
- Slow char or Quick Char
- Charge up Time – Time to achieve full charge
- Cur: Charging/discharging current
- 3.000A - Battery capacity

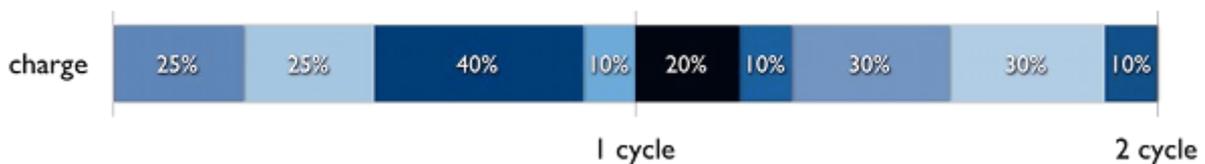
How to preserve the battery lifespan

All Flymaster instruments use Lithium-Ion batteries. Compared with traditional battery technology, lithium-ion batteries charge faster, last longer, and have a higher power density for more battery life in a lighter package.

The Flymaster lithium-ion battery uses fast charging to quickly reach 80% of its capacity, then switches to slower trickle charging. The amount of time it takes to reach that first 80% will vary depending on your settings and which instrument you're charging. This combined process not only lets you get out flying sooner, but it also extends the lifespan of your battery.

Charging is easy

Charge your Flymaster lithium-ion battery whenever you want. There's no need to let it discharge 100% before recharging. Flymaster lithium-ion batteries work in charge cycles. You complete one charge cycle when you've used (discharged) an amount that equals 100% of your battery's capacity - but not necessarily all from one charge. For instance, you might use 75% of your battery's capacity one day, then recharge it fully overnight. If you use 25% the next day, you will have discharged a total of 100%, and the two days will add up to one charge cycle. It could take several days to complete a cycle. The capacity of any type of battery will diminish after a certain amount of recharging. With lithium-ion batteries, the capacity diminishes slightly with each complete charge cycle. Flymaster lithium-ion batteries are designed to hold at least 80% of their original capacity for a high number of charge cycles, which varies depending on the instrument.



Avoid extreme ambient temperatures

Your instrument is designed to perform well in a wide range of ambient temperatures, with 5° to 25° C as the ideal comfort zone. It's especially important to avoid exposing your instrument to ambient temperatures higher than 35° C, which can permanently damage battery capacity. That is, your battery won't power your device as long on a given charge. Charging the device in high ambient temperatures can damage it further. Even storing a battery in a hot environment can damage it irreversibly. When using your device in a very cold environment, you may notice a decrease in battery life, but this condition is temporary. Once the battery's temperature returns to its normal operating range, its performance will return to normal as well. Store it half-charged when you store your instrument long term.

If you want to store your device long term, two key factors will affect the overall health of your battery: the environmental temperature and the percentage of charge on the battery when it's powered down for storage. Therefore, we recommend the following:

- Do not fully charge or fully discharge your instrument's battery - charge it to around 50%. If you store a device when its battery is fully discharged, the battery could fall into a deep discharge state, which renders it incapable of holding a charge. Conversely, if you store it fully charged for an extended period of time, the battery may lose some capacity, leading to shorter battery life.
- Place your instrument in a cool, moisture-free environment that's less than 32° C.
- If you plan to store your device for longer than six months, charge it to 50% every six months.

Keys and User Interface

Main menu navigation keys



Use cursor buttons to choose the desired operation. Push enter button to confirm and enter the Sub-menus.

Enter/change values in Sub-menus

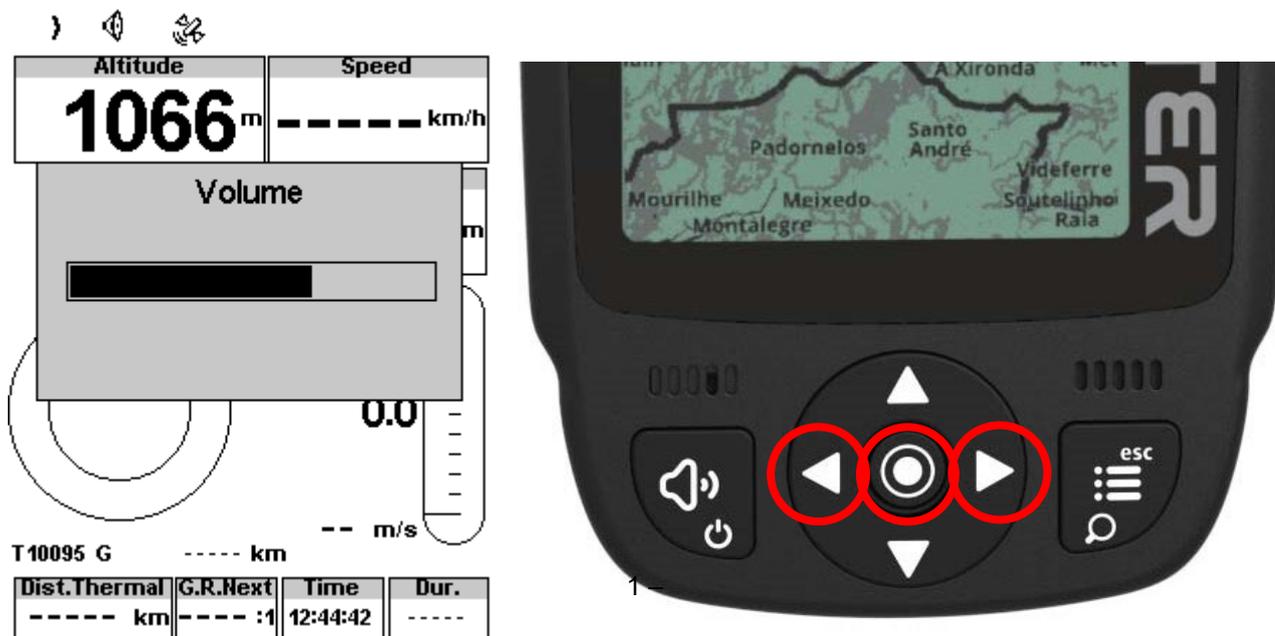
Waypoints	Route
D01151 D L	D01151 D L
D02145 D L	T10095 GR 3.6
D03124 D L	G11062 G 34.7
G01095 G	T11083 VID 34.0
G02042 G	
G03035 G (
G04067 G	
G05042 G	
G06062 G)	
G07060 G	
0000 Total: 72.3	
Add WP to Route	
Insert New WP	
Edit WP	
Delete WP	
Delete All Waypoints	
Go to Point	
Edit Route	



- Press **UP** and **DOWN** cursor buttons to chose an option in a list menu.
- Press **UP** and **DOWN** cursor buttons to change value.
- Press **ENTER** to accept the value and skip to next.
- Long press **ENTER** to skip to next line.

Waypoints	Route
D01151 D L	D01151 D L
D02145 D L	T10095 GR 3.6
D03124 D L	G11062 G 34.7
G01095 G	T11083 VID 34.0
G02042 G	
G03035 G (
G04067 G	
G05042 G	
G06062 G)	
G07060 G	
0000 Total: 72.3	
Name: G03035 G CHAVES	
Altitude: 354m	
29 N 629009	
4623470	
Landing: No	

Setting the volume

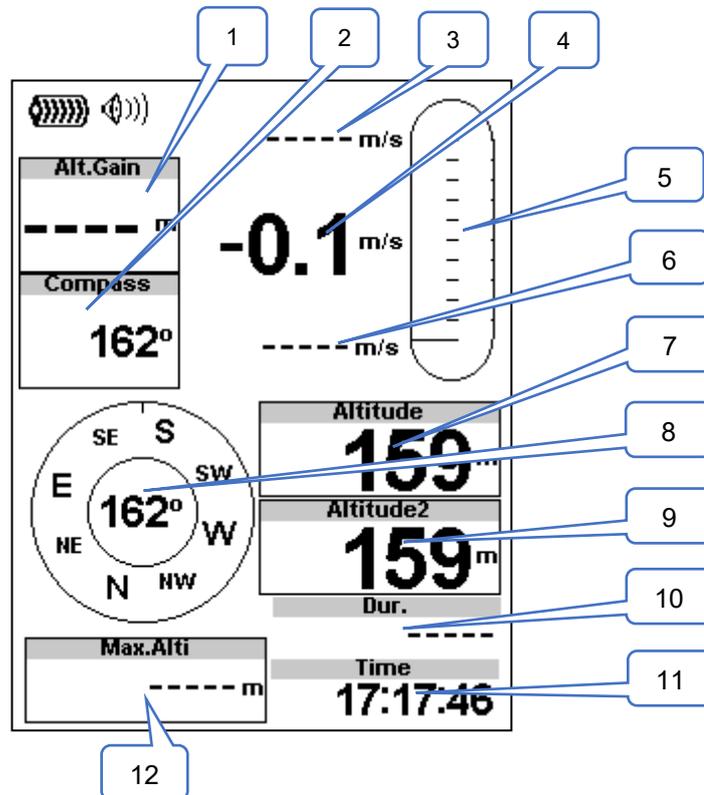


- 1 – Press (short) sound button
- 2 – Left and right cursor buttons to change the volume
- 3 – Press ENTER to confirm

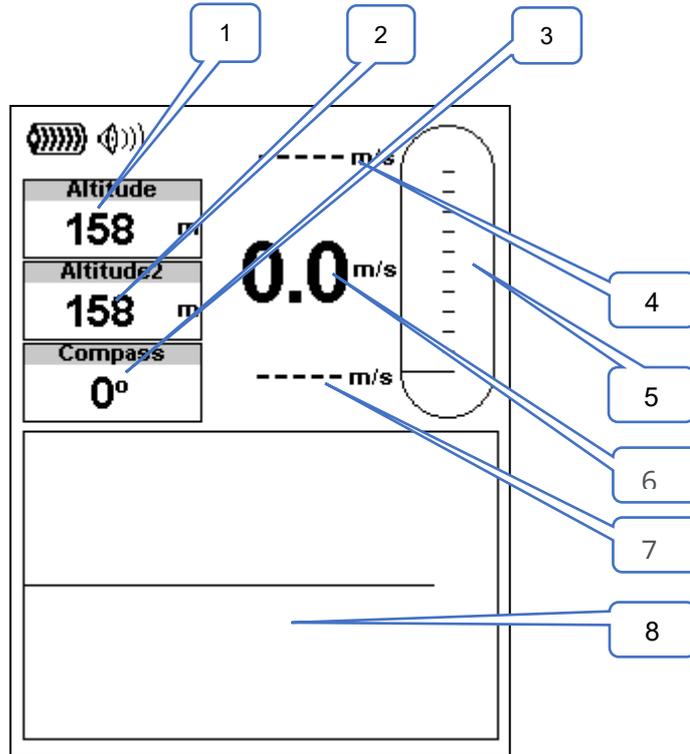
Default Pages

VARIO M allows you to design up to 8 pages in portrait mode and 8 in landscape mode, using the Flymaster Instrument Manager. In flight you can change pages manually using the ENTER button. On the following pages we will show which pages Flymaster designed and which will be default to the instrument. The description of each data field is available in this user manual in the section “available data fields”. The description of each object is available in this user manual in the section “objects”.

Page 1



- 1 – [Altitude gain](#)
- 2 – [Compass](#)
- 3 – [Max. Climb](#)
- 4 – [Vario](#)
- 5 – Graphical vario
- 5 – [Altitude gain](#)
- 6 – [Max. Sink](#)
- 7 – [Altitude](#)
- 8 – [Compass](#)
- 9 – [Altitude 2](#)
- 10 – [Duration](#)
- 11 – [Time](#)
- [12 – Max. Altitude](#)



- 1 – [Altitude](#)
- 2 – [Altitude 2](#)
- 3 – [Compass](#)
- 4 – [Max. Climb](#)
- 5 – Graphical Vario
- 6 – [Vario](#)
- 7 – [Max. Sink](#)
- 8 – Altitude Graph

Available Data Fields

Above Toff	Altitude above takeoff is the altitude over the flight starting point.
Abs.Pressure	Absolute atmospheric pressure value in Pascals.
Alt.Gain	Altitude Gain. Altitude gained in current thermal.
Alt.Gain/Loss	Altitude Gain/Loss. When at the top of the thermal displays the altitude gained from the base of the thermal, else displays the altitude lost since reaching the top of thermal.
Altitude	Current altitude. This altitude is calculated based on the barometric pressure and depends on the QNH value.
Altitude2	Second Altimeter which can be set independently to the main altimeter.
Altitude 3	Third Altimeter which can be set independently to the main altimeter.
Ave.Vario	Average Vario calculated using an integration time constant in order to indicate smoother climbing rates.
Battery	Shows battery strength as a percentage of complete charge
Compass	Angle between the magnetic North and the instrument.
Date	Current date.
Dur.	Flight Duration. Duration of the current flight.
G-Force	Current G-Force being experienced by the pilot when using the Heart-G sensor.
Max. Altitude	Maximum altitude reached during current flight. This is based on barometric altitude.
Max. Climb	Once a flight has started, it shows the maximum rate of climb encountered during the flight. This value uses the instantaneous rate of climb. This value is reset when the instrument is switched off.
Max. Sink	Once a flight has started, it shows the maximum sink encountered during the flight. This value uses the instantaneous vario. This value is reset when the instrument is switched off.
Max.G	Max Gforce reached during flight
Min. Altitude	Minimum altitude reached during current flight. This is based on barometric altitude.
Time	Current local Time.
Vario	Instant vario value.

Objects (Graphical Elements)

Graphical elements are characterized by providing information in a graphical way. Most of the graphical elements have fixed dimensions, although their position can be altered.

Battery



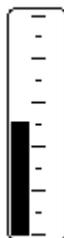
The Battery Element provides a graphical indication of the current battery level. This element has fixed dimensions.

Volume indicator



The volume indicator element provides a graphical indication of the current volume level. This element has fixed dimensions.

Vario



When the VARIO M detects that the pilot is climbing, a black bar starts to grow on the left, from the bottom of the scale to the top, with 0.1 m/s increments. The same bar grows on the right, from the top of the scale to the bottom, if sinking is detected.

Compass



The Compass element show all the data provided by the VARIO M built in magnetic compass. The compass includes an red top arrow which is always aligned with the VARIO M . If the VARIO M is turned the cardinal points will also turn in order the arrow tip points the right cardinal point.

In the example of Figure the VARIO M is pointing NW. The direction is represented by the arrow, and also indicated numerical (318°degrees).



Flight Log

Flight Log	
1	Date: 2022-07-15
2	Time: 14:09:01
	Dur.:00:11:33
	Max.Alti:- 1m
	T.off Alt.:1050m
	Above Toff:- 1m
	Max.Sink:- 14.5m/s
	Max.Climb:7.7m/s
	Max.Speed:60.0km/h
	Distance:132.6km
Generate IGC	
Delete flight	
Delete all flights	

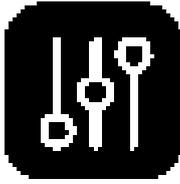
The Flight Log option allows the user to access information about previous saved flights. The top half of the screen lists details stored in memory. Each flight is identified by the take off date, time and flight duration.

After pressing ENTER in a flight log, there are 3 options available

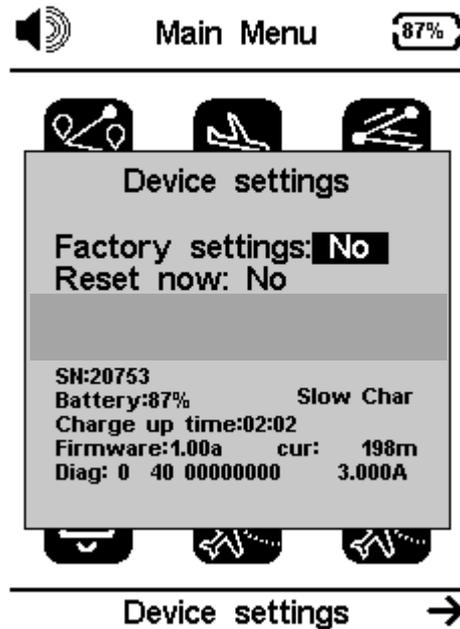
Generate IGC – This will generate the IGC for the SD card. The file will be stored in the root directory of the SD card.

Delete Flight

Delete all flights



Device settings



Factory settings - Reset all parameters to the default factory values. This will not change the layout to the factory default layout. Care should be taken because all changes made by the user are lost.

Reset Now – This will the reset the instrument to load the factory settings.

SN: Serial number

Battery: battery percentage

Charging mode (quick charge, slow charge)

Charge up time: time remaining to full charge

Firmware: firmware version

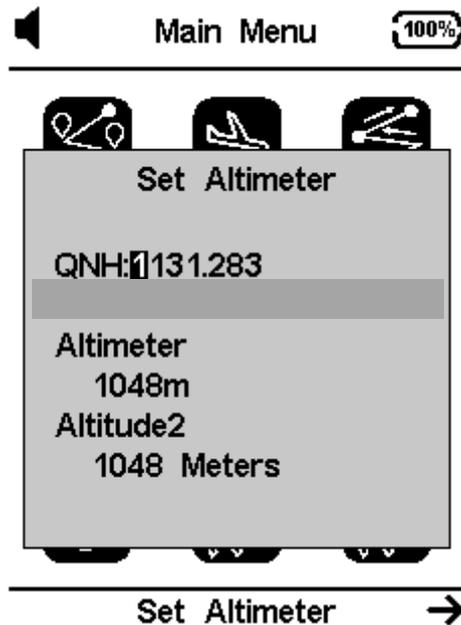
Cur: actual current being used by the instrument

Diag: diagnostic code

3.000A or other value: battery capacity reported by the “fuel gauge” IC.



Set Altimeter



The Set Altimeter page, allows the user to adjust the barometric altimeter. A barometric altimeter calculates altitude based on atmospheric pressure, and should not be confused with the GPS altitude, which is calculated based on satellite information. Since atmospheric pressure can vary substantially with meteorological conditions, and so with time, the barometric altitude also varies according. In order to have the correct altitude for a certain place the altimeter should be calibrated. Altimeter - Calibrating the altimeter can be achieved by entering the know altitude of the location. Entering an altitude automatically calculates the QNH, which is the local barometric pressure adjusted to sea level.

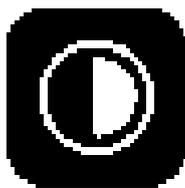
QNH - Alternatively, the altimeter can be calibrated by adjusting the QNH for the local, and time. Changing the QNH will adjust the barometric altitude. Altitude can also be set from the GPS.



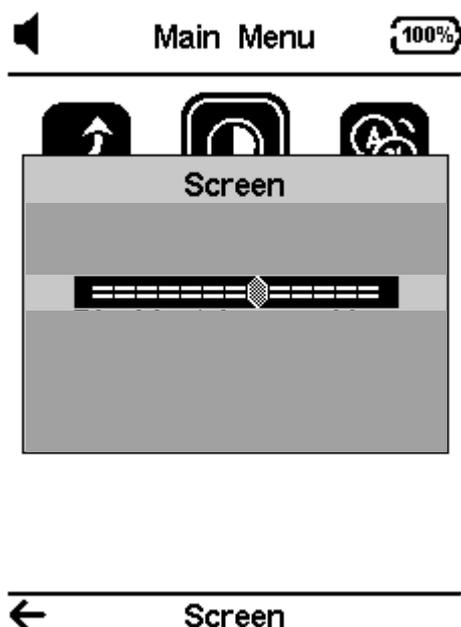
Time



Vario integrator - The Integrated vario is calculated by integrating the vertical speed during a period of X seconds defined by this value. In the example, the integration period is 5 seconds (default value).

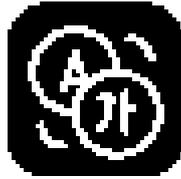


Screen



The screen menu option allows the user to set the Screen contrast to Enable/Disable the pages triggers, and to colour-invert the titles.

Contrast may be adjusted to the pilot's needs. You can use the LEFT, and RIGHT cursor keys, to move the contrast bar. When in the desired position push the ENTER key to confirm the value.



Language units



The Language/ Units menu option allows the user to change the VARIO M interface language and units.

The UP, and DOWN keys, can be used to change each field option. Pushing the ENTER key confirms the current field value, and highlights the following field. Pushing, the ESC key will undo changes.

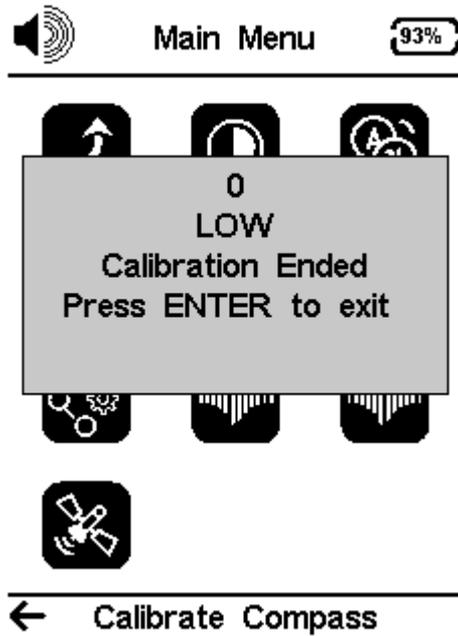
Language: Defines the interface language.

Altitude units: Altitude Units. Altitude can be show in Meters, or Feet.

Rate of Climb Units. ROC can be show in m/s, or 10 x Feet/ min



Calibrate Compass



Use the cursor buttons to navigate the Menu. Press ENTER to choose Calibrate Compass from the main menu. Press ENTER to calibrate. Rotate the instrument slowly in all possible axes freely. A 20 second countdown will be visible as the calibration status. During and after the process, the result of the calibration quality is shown, which varies from low, medium or high. The process ends with the message “calibration ended”. Repeat as many times as necessary until you possibly get a better result, which will be HIGH.



<https://youtu.be/P-4BvvM3xW0>





Vario acoustics



The Vario Acoustics settings menu option allows the user to change vario sound related parameters. The user can change the climbing, and sinking rate sound through the respective threshold values. These thresholds correspond to the climbing and sinking rates at which the sound activates. The user can also define in the the Acoustic Thresholds option the sink alarm and the sound volume of is the VARIO M.

Sink Threshold - The Sink Threshold is the rate of descent at which the vario will emit a low frequency sound. Contrary to the climb sound the sink sound is continuous. The deeper the sink rate the lower the sound frequency. Default value for this parameter is -2 m/s, we suggest setting a value lower than the natural sink rate of the glider when flying with speed bar in still air.

Climb Threshold - The Climb Threshold defines the rate of climb at which the vario will start beeping. The frequency of the first beep is defined trough the Base Frequency parameter, and steadily increases according the Increments parameter value. The default value for Climb Threshold is 0.1m/s. This means that beeping starts once the instantaneous vario value goes above 0.1m/s.

Sink Alarm - The Sink Alarm defines a vertical speed value at which a sound (alarm siren) starts to be produced. For example, if the Sink Alarm is set to -10m/s, then if the instantaneous vario goes below -10m/s, and alarm will be "red. This alarm can be used to identify high vertical speeds, as for example, in a spiral dive. The Sink Alarm parameter can vary from 0 to -25m/s. Set the Sink Alarm to OFF to disable the alarm.

Base Frequency- The audio frequencies can be adjusted to match the user's preference, by setting the Base Frq and Increments.

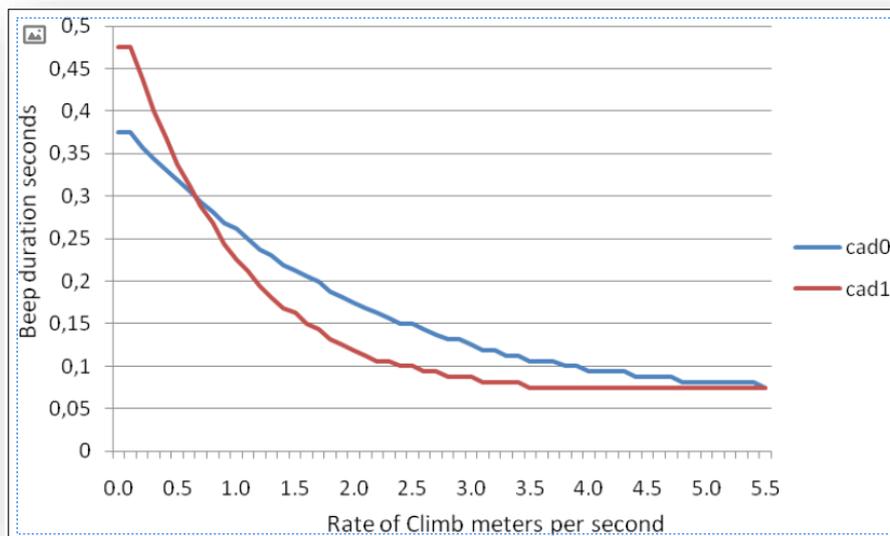
The Base Frq is the first frequency used to produce the initial sound which corresponds to the climb threshold (by default 0.1 m/s). Later, as the climb rate increases, a bip, bip sound is produced for which the cadence, and frequency, also increase. The Base Frq can be set from 500 to 1500 Hz. The higher is the frequency value, the higher pitched the sound is.

In order to change the base frequency value press the ENTER key after the Audio Frequencies menu option is highlighted. This action will highlight the Base Frq value so it can be increased using the UP key, or decreased using the DOWN key. The ENTER key should then be pressed, thus confirming the Base Frq setting. The pre-set value for Base Frq is 700 Hz.

Increments- The Increments parameter sets the frequency increment for each 0.1 m/s climb rate increase. The increments can be set from 1 to 99 Hz. The pre-set value for Increments is 10 Hz.

Considering an Increments value of 10, and Base Frq of 700 Hz, the vario frequency at 1 m/s is 800 Hz.

Cadence - When a rate of climb is higher than that specified by the Climb threshold the VARIO M creates a beeping sound. The rate (cadence) of the beeps increases as the climb rate increases. This increase in rate is not linear. The cadence parameter specifies which cadence curve should be used. Current there are 2 possibilities represented in the graph of Figure below.



Buzzer - Is so called because of the sound it emits, which resembles a buzzing sound. The buzzer sound is produced when the rate of climb is close to, but has not yet reached the specified Climb threshold. This value is set between 0 and 9 with each unit corresponding to be 0.1 m/s, ie. 3 is 0.3m/s. Subtracting this decimal value from the climb threshold will give us the value

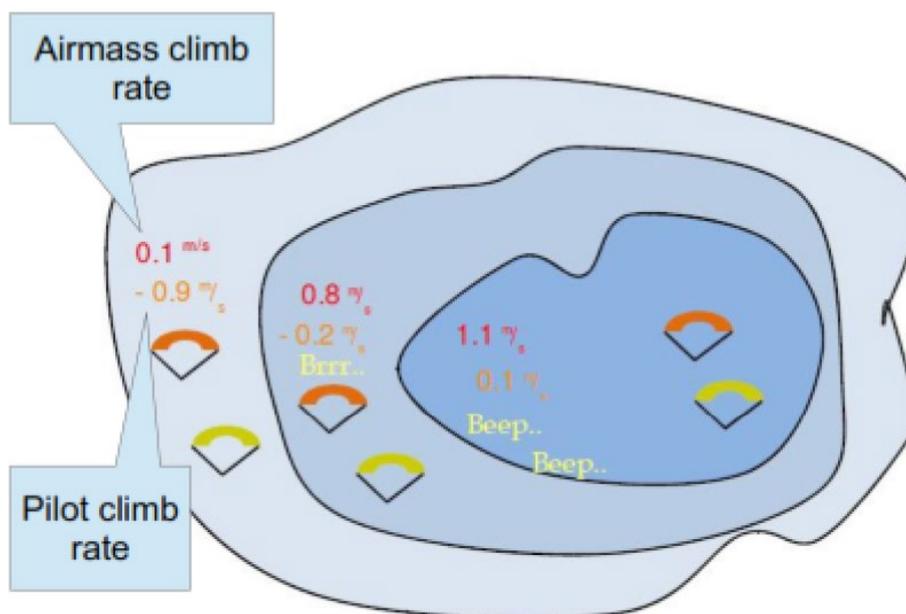
at which the VARIO M will start buzzing. For example with the VARIO M default values, Climb threshold=0.1m/s, and Buzzer=3 (0.3m/s) the buzzing will start at -0.2m/s because $0.1 - 0.3 = -0.2$. In this case at 0.1m/s directly below the Climb threshold the LIVE DS will emit a constant sound varying rapidly in pitch from around 100hz to the set base frequency at which the first beep is emitted. This is the buzzer sound and may resemble a growl noise.

Setting the Buzzer value to 0 will disable the buzzer feature.

Although the Buzzer will sound very annoying on the ground it becomes an amazing companion in flight allowing the pilot to pick-up thermals he would have usually missed

A practical example of the advantages of the buzzer feature can be illustrated in Figure below. In this example both pilots are sinking at -1.0 m/s. The orange paraglider has a VARIO M for which the climbing threshold is set to 0.1 m/s and the Buzzer parameter is set to 3 (0.3 m/s). The green paraglider has a typical vario for which the climbing threshold is set to 0.1 m/s.

As shown in the figure, when both pilots enter the thermal nothing is heard. The air is rising at 0.1 m/s but both pilots are descending at -0.9 m/s. In the second zone of the thermal the air is rising at 0.8 m/s, and so pilots are descending at -0.2 m/s. At this stage the orange pilot starts to hear the Buzzer brrrr sound of his VARIO M, which helps him to centre the thermal, while the green pilot is still unaware of the thermal. Finally, in the 3 zone, the air is rising at 1.2 m/s, and so both pilots climb at 0.2 m/s. The VARIO M pilot starts to hear his vario beep... beep... sound, and it is only at this point the green pilot hears the first beep from his instrument.

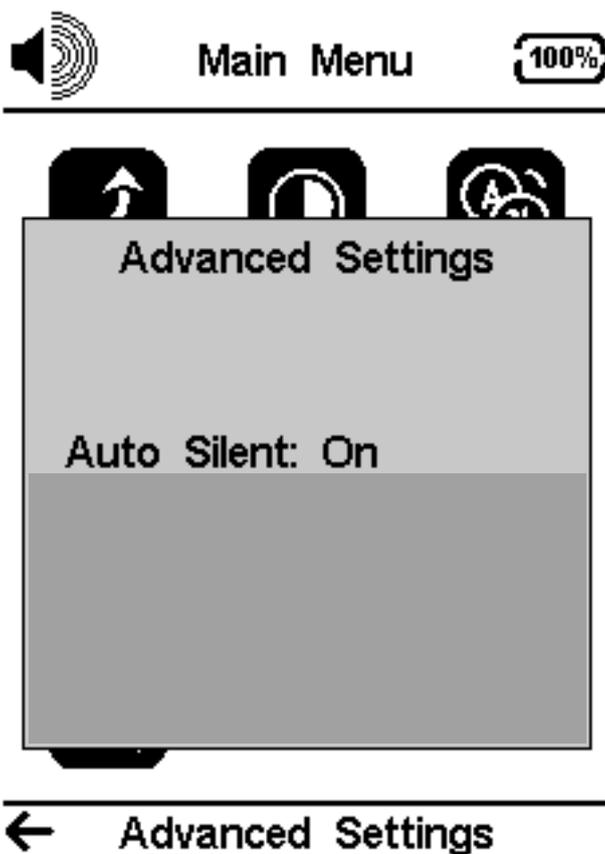


Damper - The VARIO M's vertical speed calculation is based on air pressure variations. It is very seldom to have air pressure absolutely stable. Turbulence caused by air moving near the sensor is sufficient to cause small variations in pressure. For this reason the VARIO M filters (averages) the pressure data to prevent constantly detecting tiny pressure variations. The value that defines how much the pressure is filtered is the Damper. Setting a lower damper value causes the VARIO M to become more responsive but harsher. Inversely a higher value causes the VARIO M to be less responsive but smoother. The default value is 6.

Dynamic Frequency- The VARIO M beeps at a specified pitch (frequency) when a certain rate of climb is encountered. When dynamic frequency is zero, the pitch (frequency) of that beep will remain constant if the rate of climb changes. With dynamic frequency on, the pitch of the beep may vary if the rate of climb varies during the individual beep.



Advanced Settings



Auto Silent- Setting Auto silent option ON will keep the VARIO M 's vario quiet until a Start Flight has been detected. This function avoids listening the vario sound while waiting to take off. The audio will then be kept active until the VARIO M is switched off. The default value for the auto silent parameter is ON.

Flymaster Instrument Manager Software



Automatic firmware update - After launching the "Flymaster Instrument Manager" application and if your instrument is connected to your computer's USB port, it may be possible that there is a new firmware version available for your instrument. If you want to update, just answer "start update" and the process will be automatic. Your instrument will restart, and a progress bar will appear.

Main Screen and tools



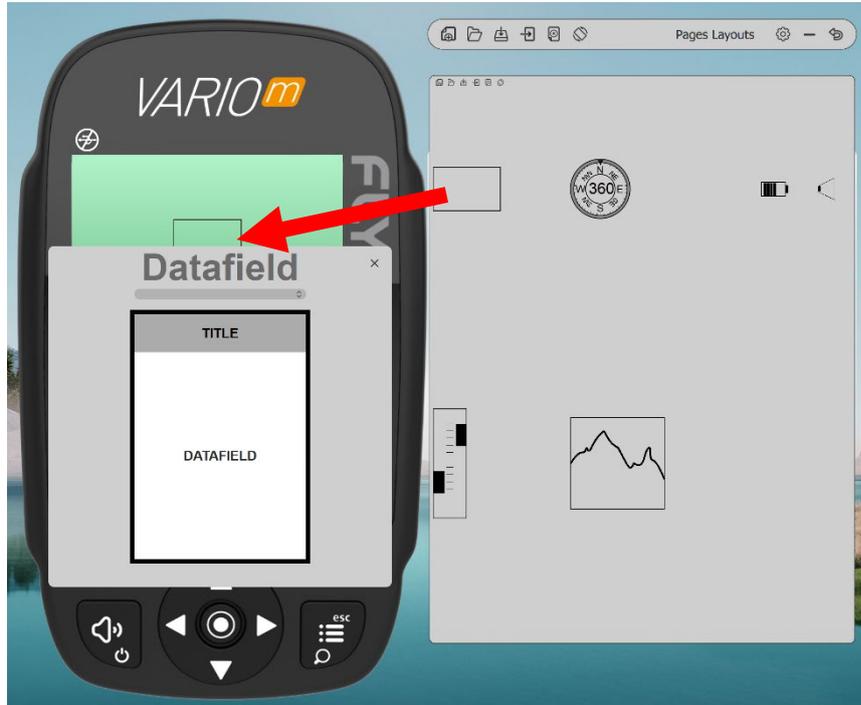
- 1 – Previous Page
- 2 – Connection state and info
- 3- Page name (click to edit. [Can be visible in a data field](#))
- 3 – Connection state and info
- 4 – Next Page
- 5 - Pages Layouts
- 6 - Update firmware tool
- 7 – Current tool
- 8 – Settings tool
- 9 – FIM settings

Pages Layouts data fields and objects



- 1 – New pages layout
- 2 – Open pages layout
- 3 – Save pages layout as a file
- 4 – Send pages layout to instrument
- 5 – Delete page layout
- 6 - Rotate layout
- 7 – Current selected tool
- 8 - Volume indicator object
- 9 - Battery indicator
- 10 – Altitude graph
- 11– Compass
- 12 – Vario object
- 13 – Data field

Customizing datafields and objects

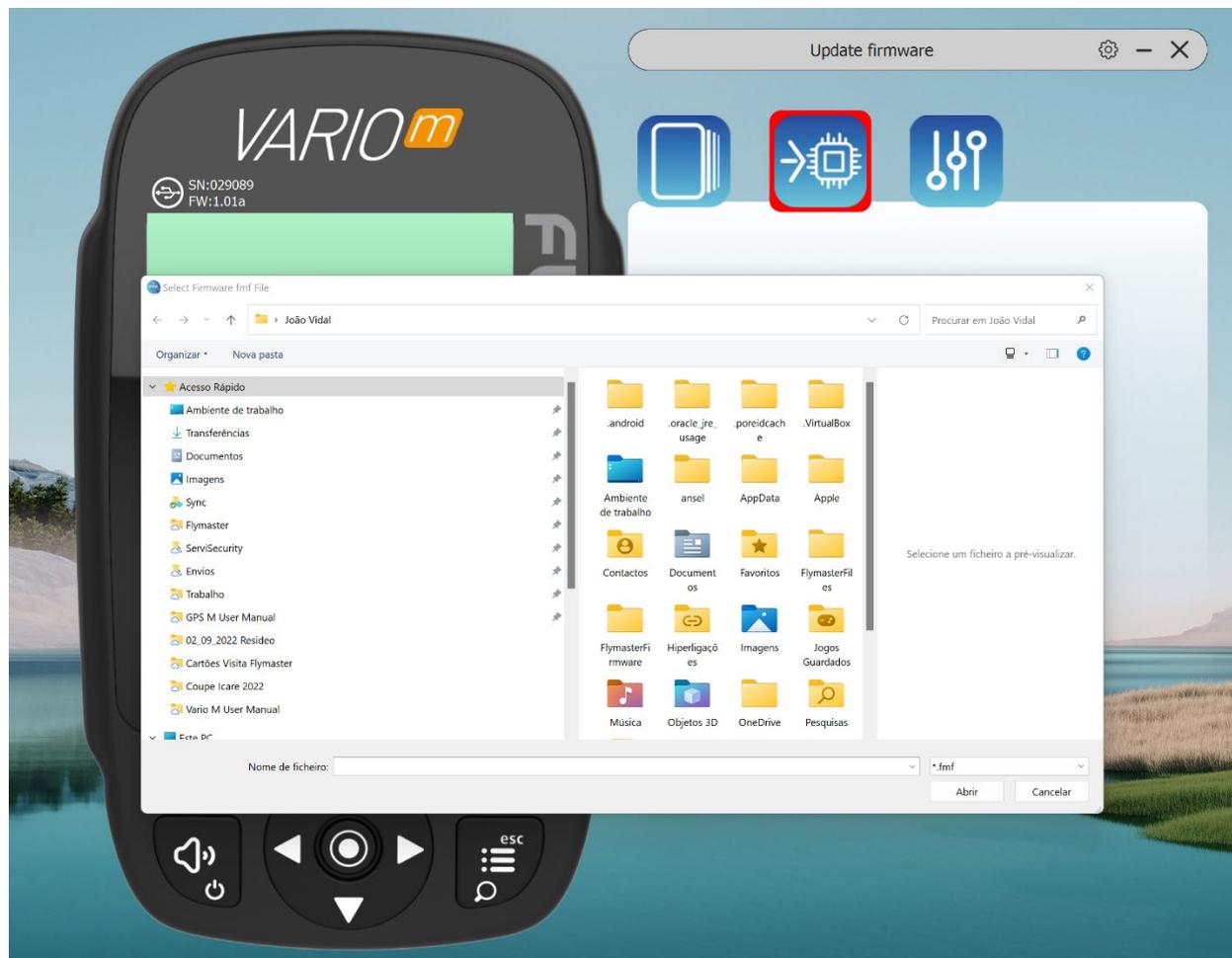


After dragging a data field or double click it will show the customization pop-up window of it.

It's possible to change :

- The datafield (data you want to see)
 - The title and font size
 - The border
 - The datafield font

Manual firmware update



In this tool you can force manual firmware update. Just download the firmware package file, from the Flymaster website and save it to your hard drive. Then just point your location and the process will proceed normally.