Total Vario User Manual

Version 33.00
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Contents

1 Safety Notes

You use the TotalVario app entirely at your own risk and responsibility.

- **TotalVario is NOT a certified instrument.**
- **Do NOT make any safety-critical decisions based on this app. Especially, do NOT rely on it when flying over unlandable terrain.**
- **Be aware that wrong sensor data or a bad GPS will lead to wrong calculations.**
- **Be aware that dislayed values for wind, glide ratio, arrival height are estimated average values which always include a certain error.**
- **Fly only under appropriate visual flight conditions.**

A special WARNING addressed to HG Pilots

Pilots having problems with their landings often try to use the stall alarm as a helper to find the correct moment to push out. At the first glance, this seems to be a nice idea. But **be aware that this is dangerous** for several reasons:

- The pitot sensor can fail
- The pitot calibration can fail
- The instrument/software can fail
- Thermal/turbulent air may trigger the alarm too early or too late
- In strong head wind, it is dangerous to push out at all

If you rely blindly on the instrument and the airspeed has an error of only a few km/h, you will push out too early or too late, and may injure yourself severely!

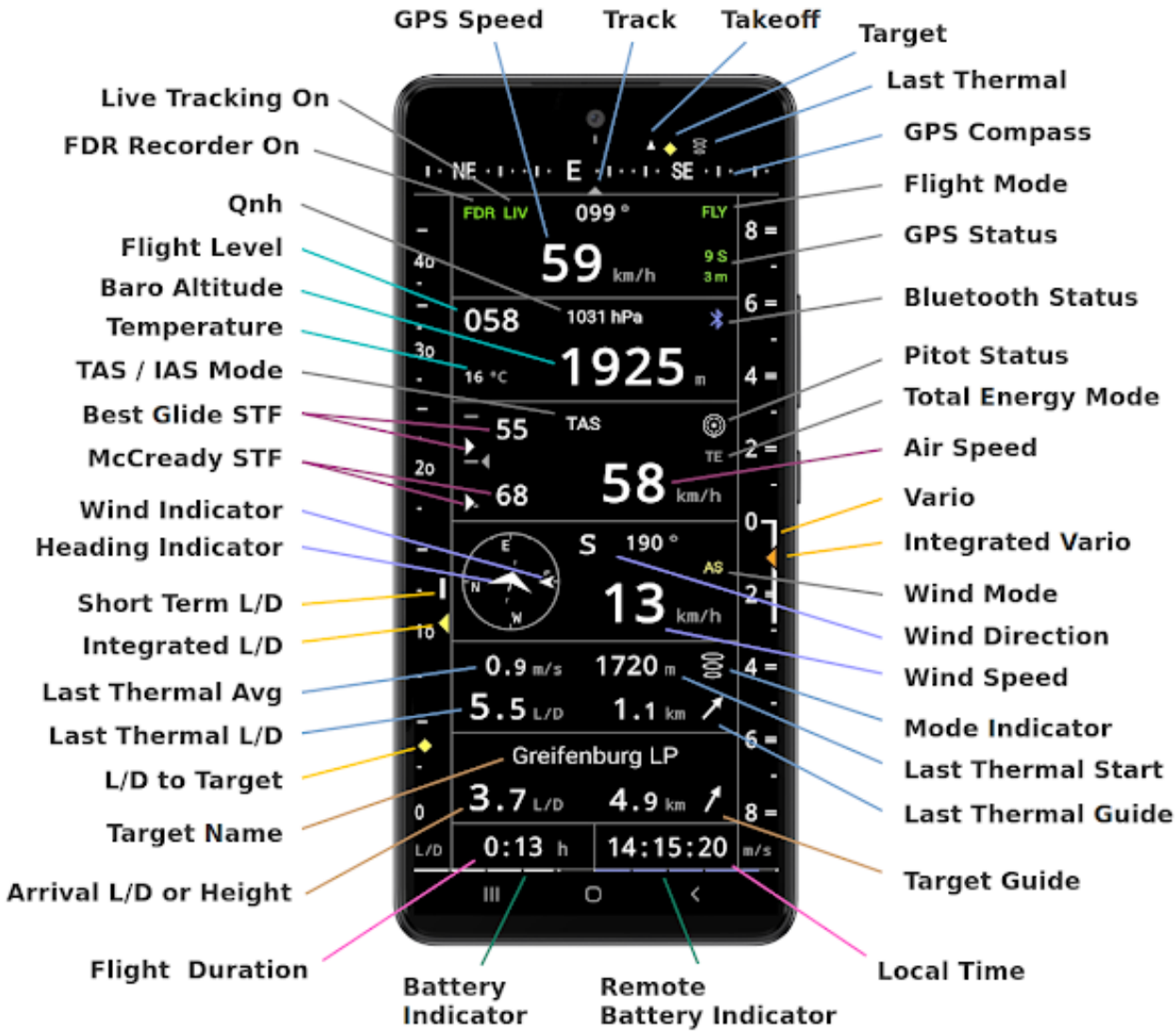
Learn to land your hangglider safely by yourself, without any instrument. Fly a hangglider that corresponds to your experience and skills. Only after your landings are perfect, you should proceed to a higher classified model.

There is no other or better way. So, **NEVER ever rely on the stall alarm!**

Also, you would need to set the alarm speed nearly equal to the trim speed to get the alarm right in time to react. Consequently there would be lots of alarms during normal flight…

2 Main Screen

Hangglider Mode, all Features Enabled



2.1 GPS Compass

Shows the direction of motion relative to ground, as reported by the GPS receiver, similar to a magnetic compass. As the GPS reports only one position record per second, a damping factor is applied to smooth the display during slow turns.

Three different symbols in the compass show the direction to

- the current target (yellow rhombus)
- the takeoff location (triangle pointing up), and
- the best entry point of the last stored thermal.

2.2 Glide Ratio

This instrument shows the glide ratio (L/D = lift/drag) over ground. 10 means that you make 10 meters distance over ground with loosing 1 meter height.

The **small white bar** is the 'short term' glide ratio calculated from the variometer (vertical speed) and from the GPS speed over ground. It is calculated over a few seconds, the interval is selectable in the **settings**.

The **yellow triangle** is the 'integrated' glide ratio. It is obtained from the ground distance flown in the past time interval (see **settings**) divided by the related height loss. If you fly a few circles within a straight glide and gain some height, the triangle will go up (and afterwards probably down again).

Obviously, these two indicators are relevant only in more or less straight glide. If there is no reasonable data (for example during climb, while circling or flying zig-zag) the markers may not be displayed at all.

The **yellow rhombus** icon is the geometrical glide ratio (distance / height-difference) from your current position to the target waypoint (normally either your airfield, or the position automatically set at takeoff).

Target calculations are made without any extra safety margin. If the indicators are all at the same level, the target is NOT safely reachable.

Generally, always make sure that you have an alternative place to land that you can reach safely.

2.3 Vario

An analog variometer indicating instantaneous (bar) and integrated (triangle) vertical speed. You can configure the integration time in the **settings**.

The meaning of the scale numbers depends on the vertical speed unit (**settings**):

- **[m/s] Ranges: 0-4 / 0-8 (1 = 1 m/s)**
- **[ft/min] Ranges: 0-8 / 0-16 (2 = 200 ft/min)**
- **[knots] Ranges: 0-8 / 0-16 (2 = 2 knots)**

The display switches automatically from the small range to the big range and back.

If an airspeed sensor is used, and if the **Netto Vario** option is enabled in the **settings** (and a correct polar curve is configured), the instantaneous vario bar is extended so that the relative netto climb speed is shown (with blue color on top). The netto vario can be useful when flying with high speed through regions with 'useable' thermal air. It is only active when the glide path is more or less straight forward.

2.4 Speed and Course over Ground, Status

Shows GPS data and status. On the top left and right there are text indicators related to flight recorder status, live tracking status, and operation mode.

2.5 Baro Altitude

Shows the current Flight Level (top left) and the barometric altitude with the corresponding Qnh-value. A Bluetooth icon appears if an external sensor is configured (blue when connected, else the icon is blinking).

Furthermore the temperature is shown. This can come from a real sensor depending on the configuration. If no sensor is available, a coarse estimate is shown (based on standard atmosphere).

Caution: **Be aware that this is the barometric altitude!**

- The barometric altitude increases if the local atmosphere pressure drops during flight, leading to bad, too optimistic display values.
- As usual in aviation the barometric altitude is only correct for standard atmosphere. Temperature has a significant impact.
- The top value is the speed to fly (STF) for best glide, the bottom value is the configured McCready speed to fly. In flight, two triangle icons are displayed on the small vertical graph, the upper one is for best glide, the lower one is for the McCready speed. The STF values will change continously while flying.
  The two triangle icons will not be visible while you are flying circles. They become green if you fly through regions with 'useable' thermal air, in which case you should fly with the speed of minimum sink.
- In flight, decide which speed you want to fly and try to keep the related triangle close to the marker at the middle of the scale. This will be more difficult in turbulent air. Adapt your speed slowly. If the relevant triangle moves to **above the middle**, you are too fast (i.e. "flying towards ground"). Otherwise, if the triangle is **below the middle** you are too slow for the corresponding STF.

You can configure the integration time for the STF display in the **settings**.

2.6 Airspeed (if configured)

Shows the current speed (TAS or IAS, see flight menu) and related information.

On the left, the McCready speed indicator is located. This indicator is only relevant while you are flying straight forward without gaining height.

2.7 Wind / Heading

The compass ring on the left side indicates the true direction of motion (top = current course).

If a reliable wind estimation is available, the wind direction is shown by an arrow on the compass ring, and the wind speed is displayed on the right side.

The orientation of the hangglider / paraglider relative to the direction of motion is visualized by a corresponding icon. The icon rotates left or right in cross wind. This helps to interpret the current motion status.

2.8 Thermal Guide (if configured)

This display box is provided to support thermal flying. Basically it has two modes

- Inside thermal / circling - shows the data when circling in a thermal
- Not in thermal - points to the last "good" thermal that was saved and shows related data

The minimum average climb speed and altitude gain to classify an updraft as "good" are configurable (Menu Flight - Thermals). As long as no good thermal is known, the last thermal after takeoff is used (even if weak).

When circling in a thermal, the base entry altitude, the altitude gain reached, and the average climb speed are displayed. The arrow points to the point of best climb within the last 60 seconds, besides that the related value is indicated. The circle symbol becomes green when the thermal is classified as good.

Example: Inside a new, 'good' thermal

- Overall climb speed so far 1.8 m/s
- Thermal start base height 1930 m
- Now 423 m climbed
- 60 sec best lift 6.9 m/s at about 30° right

When you fly more or less straight in the direction of the last good thermal, the thermal guide points to the best entry position and displays the corresponding

geometric L/D value. The best entry position is usually the highest reachable point in the thermal, given the current average L/D.

Example: Flying towards last 'good' thermal

- Base entry of the thermal was at 1720 m
- Effective climb speed was 0.9 m/s
- L/D to best entry point is 5.5
- Best entry point is at 1.1 km about 45° right

2.9 Target Guide (if configured)

The target screen shows the current target name, distance, an arrow which indicates the target bearing, and either the geometrical glide ratio, or the estimated arrival height.

If you are flying towards the target, the estimated arrival height is shown as soon as a distance-based glide ratio and an instantaneous speed-based glide ratio (both towards the target) are available.

Otherwise, or if you are far away from the target (10000m or 30000ft), the raw geometric glide ratio to the target is shown.

If you are within the target radius, the height above target is displayed, which is the current **barometric (!)** altitude minus the target elevation. If you use a waypoint as target, take care that the waypoint elevation is correct !

When the hangglider/paraglider is gaining height, or when the glide ratio is too small or too big for whatever reason, the target calculations are skipped (because the result is not meaningful / not reliable).

To get an estimate for the arrival height, fly towards the target for at least as long as the configured time interval of the integrated glide ratio.

Example: Direction towards target

- 8.8 km distance, about 15° ahead right
- estimated arrival 770m above target elevation

Example: Direction away from target

- 5.7 km distance, about 120° backwards left
- geometrical L/D 3.3

Example: Direction towards target

- 2.1 km ahead
- estimated arrival 190 m - caution, very low!

Example: Close to target

- baro altitude 278 m above target elevation

Caution:

- **Be aware that the estimated arrival height and geometrical L/D are just additional guides! Do not blindly rely on these values.**
- **Target calculations use the barometric altitude and the elevation of the target waypoint. If the target waypoint elevation is wrong or QNH is not set correctly, the displayed values are wrong!**
- **The estimated arrival height can significantly change on your way to the target, due to changing wind and vertical air motion.**
- **Always judge the situation by yourself and fly with an appropriate safety height.**
- **Never fly at critical altitude over unlandable terrain. In any case at least one landing field must be safely reachable from your current position.**

2.10 Flight Time / Local Time

On the right side, local time is displayed. The flight time counter on the left side starts/stops automatically at takeoff/landing.

2.11 Battery / Remote Sensor Battery

Without external sensor, the bold line at the bottom indicates the internal battery percentage reported by the smartphone.

If a Bluetooth sensor is connected and if battery information is available, two lines are displayed, at the left for the smartphone battery (white or green if charging), and at the right for the sensor battery (blue or yellow if charging).

Note that the percentage is an estimated value (mainly derived from voltage) which is not very precise, especially at low/changing temperatures.

2.12 When you are flying backwards...

At high wind speed especially paragliders may be flying backwards (with a backwards speed component depending on the heading).

In this case you may see the following on the display:

- The GPS speed is displayed in orange color and is blinking.
- The glide ratio markers are not displayed.
- If a wind estimate is available, the PG/HG icon is rotated more than 90° (pointing more or less with its head towards the bottom of the compass ring).
- The geometrical target glide ratio is still displayed, however all other target calculations are disabled.

3 Initial Setup

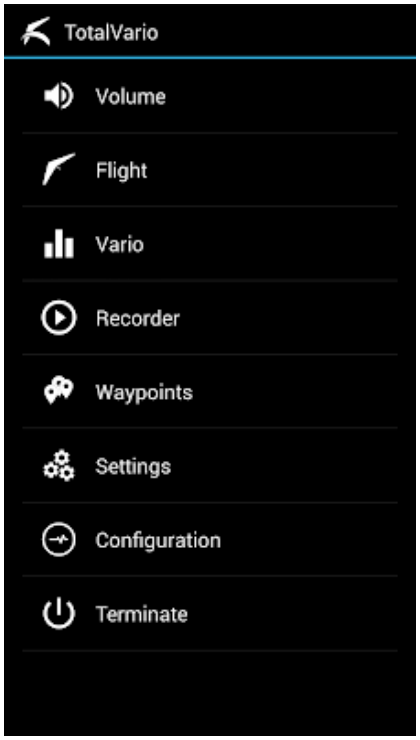
Before using TotalVario, you need to check and setup the **basic configuration** and your personal preferences. The configuration comprises everything that you would normally do only once for a specific combination of smartphone and Bluetooth device. Depending on your hardware, different features will be available.

Open the TotalVario menu using the Android **Back function**, and select the sub-menu **[CONFIGURATION]**. There you find the fundamental settings concerning Bluetooth and sensors. Furthermore you can select a secondary app to run with (and to receive data from) TotalVario.

After the initial configuration is completed, TotalVario is basically ready to run. Now the next step is the sub-menu **[SETTINGS]**, which contains a lot of options that you can adjust to your personal preferences. If an airspeed sensor is configured, you can also specify the airfoil properties here, which are used for in-flight calculations.

Finally have a look at the sub-menus **[RECORDER]**, **[VOLUME]**, **[VARIO]** and **[FLIGHT]**. There you can adjust more specific preferences.

TotalVario can manage CUP waypoint files and waypoint information stored in these files. Use the **[WAYPOINTS]** sub-menu to access these functions, to select a waypoints (*.cup) file, and to chose a target/home waypoint for your flight.



Important

Please check that your GPS is fully functional and is operating with full performance!

- Turn off power-saving mode.

- **In newer Android versions, the GPS is throttled to save the battery. This is not visible to the normal user, but for sports applications it can be a no-go.** Unfortunately there is only a hidden way to change this ugly default behavior! To force full GNSS measurements, navigate to Android [Settings > System > Advanced > Developer Mode] and activate the option "**Force full GNSS measurements**".

Developer mode can be activated on most smartphones by tapping the build number seven times. The build number can usually be found under Android [Settings > About Phone > Build Number].

Please note: With some of the Android developer mode settings, protection mechanisms are bypassed and it becomes easier for any app to hack the phone).

4 Configuration Menu

The configuration comprises everything that you would normally do only once for a specific combination of smartphone and Bluetooth device. **Depending on your hardware, different features are available.**

4.1 OPERATION MODE

First you should configure if you fly a paraglider or a hangglider. One visible effect is that the related icon is displayed in the main menu and on the wind display.

If the speed range of your paraglider is small (which is usually the case), you will probably want to use [Simple Wind Calculation] if you fly without airspeed sensor. This enables the wind estimation based on constant airspeed. If you do not select this option, you need to fly clean circles to get an updated wind estimation.

4.2 OPTIONAL FEATURES

Select if you want to use the thermals guide and/or the target guide. This influences the layout of the main screen, especially in landscape mode.

4.3 BUILT-IN PRESSURE SENSOR

If your smartphone has a built-in baro sensor, you can try if it can be used to produce reasonable results.

You need an absolutely calm day for this. Activate the option **[Use Internal]**, select **Check+Tune** and read the hints. Push **Analyze** and wait until the measurement is finished. You can accept the suggested Kalman filter value, or try again, or modify it manually at any time.

After this, check the vario tone by moving your smartphone up. As long as you do not enable the weak sink tone (menu **VARIO** - **[Profile]**) you will probably not hear much at downward motion. Be careful, do not drop the smartphone!

Then you can adjust the acoustic profile and sound using the menu **VARIO**.

4.3.1 [Barometric Pressure]

If you have an internal pressure sensor and **[Use External]** is activated, you can use this option to select from which source Total Vario obtains the pressure data.

4.3.2 [Variometer]

If you have an internal pressure sensor and **[Use External]** is activated, you can use this option to select from which source Total Vario obtains the variometer data. Some protocols/external devices provide vario data ready for use. If this is not the case, the vario data is derived from the barometric pressure using a Kalman filter.

4.4 BLUETOOTH DEVICE

You can connect devices which use the normal Bluetooth mode (such as the Bluefly Vario), as well as devices which operate in Bluetooth LE mode (such as the XCTracer). Activate the option **[Use External]** to enable Bluetooth or Bluetooth LE connections.

The option **[Force-Enable]** can be used to switch on the Bluetooth transceiver automatically whenever TotalVario is running. If Bluetooth was automatically enabled, it will also be turned off when the app is terminated.

Use the option [Bluetooth Mode] to select the connection type.

- Standard Bluetooth devices need to be 'paired' with the Smartphone before they can be used. Only paired devices are visible for TotalVario.
- For Bluetooth LE, TotalVario can directly run a scan for nearby devices.

The option **[External GPS]** can be used force TotalVario to use GPS data from the connected Bluetooth device, if available. If this is enabled, IGC flight logs will not be signed for contest.

Use the option **[Monitor]** to trace Bluetooth data from a connected device to verify ptotocol and transmission. This is helpful for debugging. The Monitor traces essential technical information about the Bluetooth connection status. Using the Run and Pause buttons, tracing of all data sent by the remote device can be switched on or off. The monitor buffer can also be cleared if needed. In case of problems, you can use the Share button to send an Email with the complete monitor content.

4.4.1 Initial Bluetooth Pairing

This step is only required for standard (not Bluetooth LE) Bluetooth. The pairing is needs to be done only once. Check the manufacturers hints. Basically the required steps are:

- Go to the Bluetooth settings of the smartphone
- Start a scan for new devices
- Switch the new Bluetooth device on
- Wait until it appears in the list of available devices
- Select the new device from the list and confirm to pair it with the smartphone

4.4.2 Connecting the Bluetooth Device

Once the device is paired (or if no pairing is required), TotalVario must be configured to use it:

- Make sure that Bluetooth is enabled on the smartphone.
- Activate the **[Use External]** option.
- Select the Bluetooth Mode **Normal** or **Secure** or **Bluetooth LE** (BLE). Verify that you have selected the right mode for the device!
- Click **[Bluetooth Device]** to open the device list.
- For BLE mode, a search for near devices is immediately started. A new scan can be started if needed using the top left circle-arrow button.
- For normal Bluetooth, the list shows the known paired devices.
- Switch the Bluetooth device ON.
- Select your device from the list. This brings you back to the configuration page.

Once the device is configured, TotalVario will try to connect it automatically whenever the app is running (and Bluetooth is enabled and "Use External" is enabled). For standard Bluetooth this can take a while, please be patient.

The Bluetooth Device menu options are dynamically adapted depending on the type and protocol detected.

4.4.3 Connecting the XCTracer

The XCTracer should be set to the XCTRC protocol. Totalvario detects the protocol automatically as soon as the XCTracer sends data (after the signal tone for the end of the adjustment phase).

If the XCTracer is detected, you can click on the **[XCTracer]** option and set the pre-damping according to your taste (actually it is the number of averaged values).

There is also an option to force the use of the external GPS provided by XCTracer. Note that in this case TotalVario does not generate signed IGC logfiles (they are already present in the XCTracer).

4.4.4 Connecting the Bluefly Vario

The Bluefly Vario detection works automatically if the Bluefly sends PRS, BFV or BFX. For the generic modes (LK8EX1 etc) - or if the Bluefly Vario version could not be detected - there is an additional step, where the user must confirm explicitly that the device is a Bluefly Vario.

If the Bluefly Vario is connected for the first time, some hardware parameters need to be initially set. To do this, use the option **[Bind Bluefly V*]**.

Attention, if you confirm this, hardware parameters of the Bluefly Vario will be permanently changed:

- The output rate will be reduced to 25 ($BOF 2*)
- The BFX mode will be set ($BOM 6*)
- Qnh will be set to 1013.25 hPa ($BQH 21325*)
- The Pitot mode will be set on ($BUP 1*) or off ($BUP 0*)

The Pitot mode will be switched on only if it is supported by the Bluefly Vario version, and if airspeed is enabled, and if the selected speed sensor mode is "Pitot". Otherwise the Bluefly Vario's Pitot mode will be switched off. Furthermore, in any case the Pitot will be switched on each time the Pitot zeroing is performed.

Once this initial configuration is done, you can also refresh the required hardware settings at any time using this function (if needed to whatever reason).

4.4.5 Connecting other external sensors

To choose the right protocol and settings, please refer to the vendor's documentation.

If the protocol provides only raw pressure data (no variometer data), you need to configure the extra Kalman filter by clicking **[Check&Tune External]**. This works in the same way as described above for the internal sensor.

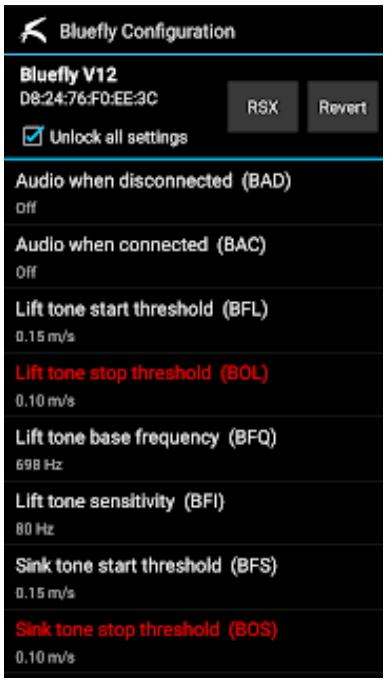
4.5 BLUEFLY VARIO

This section contains extra options for the Bluefly Vario.

You can directly enable/disable its buzzer using the **[Bluefly Vario Sound]** switch.

In addition you can use the **[Change Hardware Parameters]** option to access all hardware parameters directly. Critical parameters are initially locked.

Each time when the Bluefly Vario is connected, first its hardware parameters are read and stored. Using the **[Revert]** button it is possible to undo all recent changes by restoring the saved values.



You can use the **[RSX]** button to perform a factory reset and power-off. There are some older models which continue running after reset. **Be aware that after the power off you need to hold the Bluefly on/off button down extra long for the first start!**

4.6 TEMPERATURE + HUMIDITY

The **[Air Temperature]** option allows for selecting the air temperature data source. This can be an internal or external source, depending on the available sensors.

Android smartphones can provide different temperatures: From a special sensor if available, from the battery, or from the CPU. If no other source is available, you can try battery or CPU, but this is typically a bad choice (sometimes worse than the estimated temperature).

Generally you are offered to enter a correction value when you select the temperature source. Choose the offset so that the displayed temperature shows the current outside air temperature at your location/altitude. An offset error of a few degrees is generally not really critical except for cloud base calculation.

If no temperature sensor is available, an estimation can be used (based on the air pressure, assuming a standard atmosphere). Of course this can only produce good results in normal dry weather conditions, where the temperature decreases with height.

Be aware that an instrument pod can easily heat up to 50 degrees or more internally when exposed to sunlight, for example while waiting for takeoff. The same is true for the smartphone sensors.

Air temperature (and somewhat the air humidity) has an influence on the conversion between TAS and IAS. Independent from the type of sensor, the built-in automatic speed calibration logic - if active - will basically compensate for any linear error of the raw TAS value while you are flying. The calibrated TAS is used for navigation related calculations.

The correct IAS is calculated based on the correction factor for TAS. This is where the air temperature (and humidity, if available) is used. As a rule of thumb, a temperature mismatch of as much as 10°C causes a calculation error of only 2 %. For a typical air speed of 40-50 kph this is only about 1 kph.

If the smartphone has a built-in humidity sensor, the **[Air Humidity]** option allows for selecting the air humidity data source. This can be the internal sensor or the external device. If no air humidity data is available, calculations are performed with a fixed value of 50%RH.

4.7 AIRSPEED SENSOR

Enable this option if you want to use an airspeed sensor. Note that, after the sensor is configured, you need also to select or to create a valid polar curve and adjust the stallspeed for your hangglider or paraglider (section **AIRFOIL** in the **SETTINGS** menu).

Now select the **Sensor Type** (Bluetooth device with Pitot, or Flytec vane wheel sensor) that you will use.

Normally you will keep the option **Auto Calibrate Speed** checked. This enables the automatic airspeed calibration using GPS.

You will typically also enable **Keep Calibration After Flight**. Then, after some flight time, you will see that the **Calibration Preset** value has changed. If airspeed is not calibrated at all, you need to fly zigzag and circles for about 1/2 hour to get a stable calibration. The auto-calibration can compensate linear errors of about +-50%.

If you use a specific supported Pitot sensor, you can check the option **Auto Zero Pitot**, which will run an extra Pitot zeroing cycle (if the device supports it) each time the device is reconnected (and has not been zeroed shortly before). This option is only enabled if the sensor is connected.

4.7.1 [Bluefly Pitot Temperature Compensation]

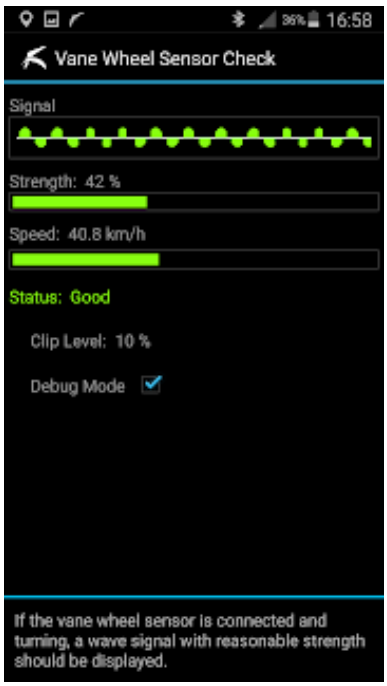
If you use a BlueflyVario V12 with airspeed extension, it is very important that you run a residual temperature drift analyses for the differential pressure sensor chip, even if you fly at rather constant air temperature (about the same altitude). This is because the chip will start warming up in operation, and because the pod will warm up in sunlight. The residual temperature drift is a non-linear effect which cannot be completely compensated by the speed calibration logic alone.

The compensation is required only once for each chip. Refer to the related chapter in the in the **Technical Guidelines** document.

This option is only enabled if a the sensor is connected.

4.7.2 [Check Vane Wheel]

This function is useful to verify the correct operation of a Flytec vane wheel connected to the smartphone headset plug.



If the vane wheel sensor is connected and turning, a wave signal with reasonable strength should be displayed, and you should see the measured true air speed. The wave signal is clipped around its zero points to calculate its frequency.

Changing the clip level can *sometimes* solve problems, as smartphones have different input sensitivities (in most cases with automatic gain control).

Note: If you use this feature, be sure that no other app has locked the microphone input. Check that any voice control features, such as SVoice, Google Assistant, etc. are disabled / stopped.

4.8 PARALLEL APPLICATION

TotalVario offers a convenient way to toggle the display when running another application in parallel, such as XCSoar. To make use of it, enable this option and choose the app from the **[Companion App]** menu section.

You can always access the alternate app via the flight menu, but there are some other interesting options, too:

- If the smartphone has a reliably working cover sensor, you can try the **[Cover Sensor]** option (see **SETTINGS - [Operation]**). With this, you can change to the alternate app just by holding your hand for about a half second over the sensor. Especially HG pilots may want to use this option for easy screen switching in flight.
- You can also access the secondary app via the screen saver. For this, tick the option **[Button on Screen Saver]**.

- In addition, for easier handling in flight, you can use the quick menu for easy launch of the screen saver directly from the main screen.

Some full-screen navigation apps make it difficult to minimize the app once it is displayed. In this case you can use the automatic timer function to return to TotalVario after some time (without any interaction).

If you activate the option **[Launch-on-Top]**, the secondary app will be started automatically on top of TotalVario each time you launch TotalVario.

4.9 INTERFACE

Use this feature if you want to forward sensor data to a secondary app running in parallel. Usually this will be the app configured before as alternate application, but basically these two features are independent.

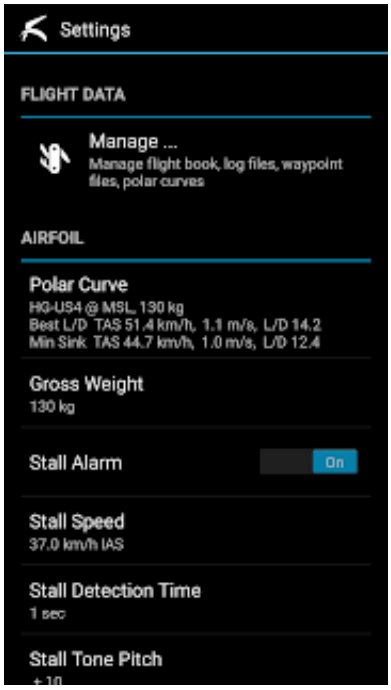
TotalVario can run as TCP or UDP client. Check which connection type is supported by the secondary app (this should be TCP or UDP server). The secondary app must be configured accordingly **for the Digifly $PDGFTL1 protocol** and with the same port(s).

With the remaining checkboxes you can select which data to transmit. For example, XCSoar can access internal GPS and pressure sensor of the smartphone, but has a rather slow variometer and a poor wind estimation method. Therefore it is a good choice to transmit Vario, Airspeed, and Wind data. This can be selected in the **Primary Interface** section.

A **Secondary Interface** to forward GPS data is also available. It uses the NMEA protocols GPGGA and GPRMC. However navigation apps can access the GPS system of the smartphone directly, which is the better choice.

5 Settings Menu

This menu contains all kinds of settings concerning your personal preferences which you will use and sometimes change, such as general flight data management, polar curve of the glider, numerical integrators, Android integration, smart features, etc.



5.1 FLIGHT DATA

The **flight data manager** operates like a file manager with special features. It provides direct access to the TotalVario files stored on the file system. TotalVario uses a predefined structure of fixed subfolders below its main folder.

Note: There are two hidden folders, named cfg/ and log/. TotalVario uses these folders to store special things, for example the Pitot temperature compensation, and the DHV-XC upload log.

You can create, copy or delete files inside the TotalVario folder. A context specific action menu is available for each file type. For example, recorded flight data files (FDR) can be selected for replay or can be converted, flight book files can be opened, waypoint files can be imported or edited, and so on.

5.1.1 [Logfile Folders /FDR /IGC /GPX]

TotalVario can produce flight log files in three different formats. Within each folder (FDR, IGC, GPX), the flight log files are organized in one subfolder per year.

The IGC folder holds all *.igc files, which can either be directly logged in flight, or later generated from FDR files. There is also an option to generate GPX files.

The most sophisticated format is **FDR**, which means "flight data record" (the extension is *.fdr). **FDR** files contain TotalVario data in full resolution. You can replay these flights using the flight recorder's playback function. This can be helpful for later analyses and for trying different settings. **FDR** files are protected against manipulations.

You can generate IGC or GPX files from FDR files as follows:

- Click on the relevant FDR file
- Select the option 'Convert to ...'
- Generated files are always created in the IGC / GPX subfolder for the year when the flight was made
- Existing files will not be overwritten

5.1.2 [Folder: Flightbook]

Independently from the flight log files, TotalVario can manage a flight book. A separate flight book file is created for each year. If the flight book is enabled, flight statistics are automatically appended. You can add a brief comment to each entry.

The flight book uses a very simple text format. It can be edited by any text editor on a PC as long as a few formatting rules are followed.

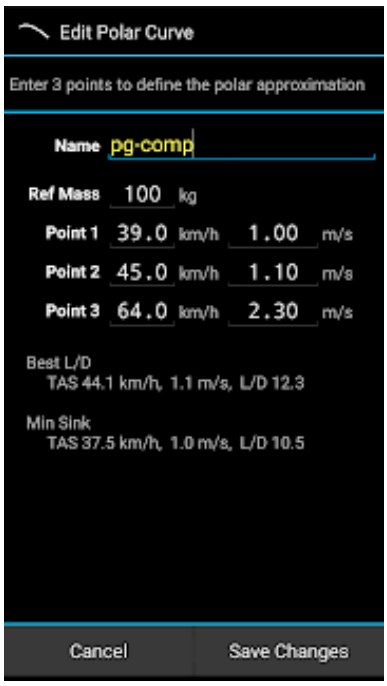
5.1.3 [Folder: Polars]

When flying with an airspeed sensor, it is useful to have the gliders polar curve for glide calculations and netto vario. The Polars folder is initially populated with a number of standard polar files. All Polars can be edited freely. New Polars can be added, too.

Total Vario stores polar curve data as CSV formatted files. You can also create your own polar curve definition using the polar curve editor:

- Open the editor by clicking on the bottom left button.
- Assign a unique name.
- Enter the reference mass.
- Enter and the reference points of the polar curve.
  You can enter three measured points (recommended), or only two points, where the first one refers to the speed at the minimum sink rate.

The polar curve is a quadratic approximation as usual.



5.1.4 [Folder: Waypoints]

This folder holds the waypoint files. You can create new empty files, copy complete files, or organize files into subfolders as you like.

Note that the Waypoints Menu provides direct access to all required waypoint management functions. There you can also select the active waypoint file to be used by TotalVario. You can also copy waypoints from one file to another one.

5.2 AIRFOIL

This section is only visible if an airspeed sensor is configured.

You can choose the **[Polar Curve]** which is best matching with your paraglider type or hang glider type and enter the **[Gross Weight]**. Note that you also can freely create your own polar curves in the flight data manager as explained above.

Decide if you want to enable the **[Stall-Alarm]** and adjust **[Stall-Speed]** as needed.

Tune the alarm tone frequency using **[Stall Tone Pitch]**. You can use the option **[Warning Limit]** to disable the alarm above a specified altitude relative to takeoff.

As stated in the saftey notes, I do NOT recommend to rely on the stall-alarm as helper when landing.

5.3 INTEGRATORS

TotalVario has separate integrators / average calculators for

- Speed based (instant) Glide
- Geometric (integrated) Glide
- Vario/Acoustic Vario and Airspeed
- Integrated Vario
- McCready Speed

The integrators can be adjusted according to personal preference. For example, STF can be set to 10 seconds to avoid too quick changes (triggering too many pilot reactions) in turbulent air.

Be aware that the integration time of the geometric glide ratio also influences the target arrival height estimation.

5.4 WIND & TARGET GLIDE RATIO

These settings control the validity range

- of the last reliable wind estimate and
- of the last measured glide ratio in the target direction.

You can configure following limits

- Distance
- Height difference

- Time period

TotalVario stores internally the location and time of the wind estimate calculated during flight. If the wind estimate is too old, or if you are too far away, the wind icon starts blinking to make you aware that the estimate is outdated. Also the STF indicator changes.

If the measured glide ratio becomes invalid, no estimated arrival altitude is displayed.

5.5 DEVICE

You can use **[Set Ringer Silent]** to avoid being disrupted by the phone ringer while TotalVario is running.

You can use the option **[Set Brightness]** if the smartphone does not properly adapt to environmental light.

If you are normally using the Smartphone in the automatic display rotation mode, you can also force the **[Screen orientation]** to landscape or portrait while the app is running.

5.6 OPERATION

You can configure the **[Menu Mode]** for single-tap, double-tap or triple-tap operation. This affects the quick menu on the main screen, the button(s) on the lock screen, and the Android button 'Back' used to opening the **SETTINGS** menu.

Double-tap provides more robustness against accidental screen touch. This is the recommended setting. For example, it prevents erroneous interaction when you carry a hangglider through high grass, and the pod/smartphone is touched by pieces of grass.

TotalVario has a fixed, built-in **smart menu**, which enables direct access to essential flight menu options, to the screen saver and to the replay dialog (in replay mode).

With the checkbox **[Smart Menu]** you can activate the smart-menu in flight, on ground, or for both. I use both, because it eases access to essential settings in flight, if the need should arise (which rarely happens, to be honest).

When enabled, the smart-menu is opened by (multiple-)clicking one of the central fields on the main screen. The assigned functions are from top to bottom:

- **GPS / Speed:** Activates the screen saver in normal mode, shows the recorder controls dialog in playback mode

- **Baro Alitude:** Flight menu (essentials i.e. Qnh, Takeoff Detection, Alternate app, Flight book usage)
- **Air Speed:** IAS/TAS, McCready preset, Pitot zeroing
- **Wind:** Configure display, view atmosphere data (depending on sensors)
- **Thermals Finder:** Settings for last good thermal threshold
- **Target Guide:** Target waypoint, set takeoff as target, current position

You can use the **[Coverage Sensor]** option to switch between TotalVario and a companion app (selectable in the **Configuration**) just by holding your hand for about a half second over the sensor. Especially for HG pilots this option is useful for easy screen switching in flight.

Depending on the smartphone hardware, you can select either the **Proximity** sensor or, if that is not available, try the **Light** sensor.

If no companion app is configured, the cover sensor switches between the screensaver and the main screen in flight mode.

On ground the cover sensor does NOT unlock the screen saver. This is to avoid spurious unlocking / touch screen operation. In flight the cover sensor can be used to unlock the screensaver, of course.

Note: There may be restrictions depending on the smartphone model and Android version.

- On newer Android versions, this function is partially disrupted because apps do not receive sensor information when they are not visible on the display. In this case, the coverage sensor can be used to launch the companion app. To automatically return to TotalVario, you can use the "Main screen - Force after timeout" option.
- On some smartphones, the coverage sensor is internally enabled only during a phone call, which prevents other apps from using it.
- Although most smartphones have a built-in ambient light sensor, there can be big differences in the sensitivity of this sensor.

5.7 SCREEN-SAVER

You can activate timers and select corresponding timeout periods for the main screen and for the screensaver. Decide if you want the timers to run in flight, on ground, or in both cases.

In addition, these screens can be activated automatically when TotalVario detects a takeoff / a landing.

Example

Use following settings:

- Both timer options checked
- Force screen saver after 30 sec **on ground**
- Force main screen after 60 sec **in flight**
- Secondary app configured
- Cover sensor enabled

Start TotalVario and open the secondary app via the flight menu. This also tells TotalVario that the secondary app is now being used. Change back to TotalVario using the Android app drawer (or using the cover sensor). After this preparation, the behavior is as follows:

While staying on ground (before takeoff):
If the TotalVario main screen is on display, the screen saver is activated after 30 seconds. You can unlock the screen manually by clicking the TotalVario icon, or on the alternate app icon.

While flying:
A few seconds after takeoff (when motion is detected), the main screen is automatically displayed, regardless whether the screen saver or the secondary app are active. As configured above, the screen saver stays passive while flying (except if you would use the quick menu to activate it manually).
After the secondary app is brought to foreground (via the button on the screen saver, via the flight menu, or via the cover sensor), the main screen timer is triggered. After 60 seconds TotalVario will be shown in foreground, pushing the secondary app to the background.
Finally, at landing (after a fixed period without motion), the screen saver is activated.

Note: The automatic screen switching is disabled as long as the TotalVario menu is opened.

5.8 UNITS

You can customize the units to be used for the different types of data:

- Distance (km, mi, nm)
- Height (m, ft)
- Speed (km/h, mi/h, knots)
- Lift (m/s, ft/m, knots)
- Pressure (hPa, inHg)
- Temperature (Celsius, Fahrenheit)
- Weight (kg, lb)

5.9 APPLICATION

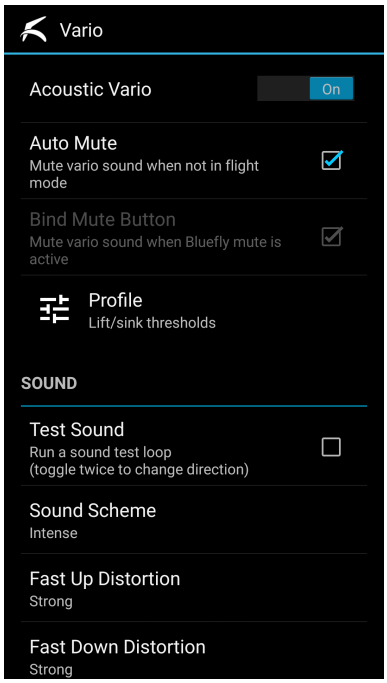
[Information] shows the Disclaimer, Legal Notes, Copyright, Android Permissions. You need to accept this in order to run TotalVario.

[Reset] clears all settings/preferences and restores the default values. Data stored in the TotalVario folder and the Pitot temperature calibration are not affected, of course.

[Licenses] contains information of third party software licenses.

6 Vario Menu

This menu contains the settings related to vario sound.



6.1 Acoustic Vario

Used to enable/disable vario sound, for example if you prefer to use only the buzzer of the connected Bluefly or other vario.

6.1.1 [Auto Mute]

If this option is enabled, the vario sound will be switched off while TotalVario is not in flight mode.

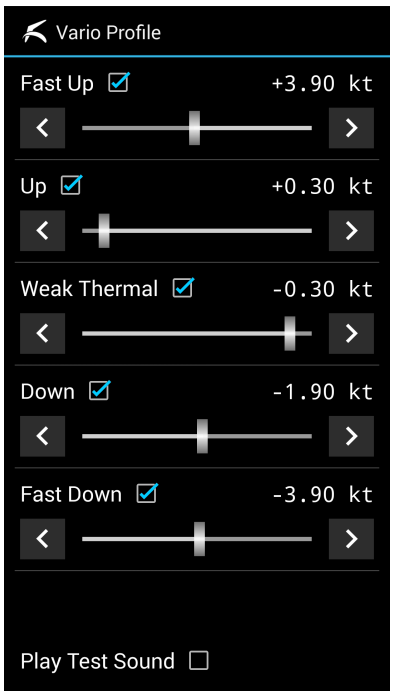
6.1.2 [Profile]

Opens the settings for the ascend/descend tone thresholds.

Use the sliders to customize the vertical speed thresholds for the different tone ranges: **Fast Up, Up, Weak Thermal, Down, Fast down**.

You can enable or disable each of these ranges by its checkbox.

To check the vario sound, activate the **Play Test Sound** checkbox. This starts a test loop which cycles over the vertical speed range. Each checkbox activation inverts the direction. For values closer to zero, the test runs a bit slower.



6.1.3 [Bind Bluefly Button]

If a Bluefly Vario is connected, you can use the button of the Bluefly Vario to temporarily silence also the smartphone speaker. The Bluefly Vario will turn the speaker back on depending the the vertical motion threshold (parameter BTT). This works as if the smartphone speaker was directly coupled to the Bluefly buzzer, even if you switch the buzzer off.

This function depends on the firmware version of the Bluefly Vario. If it does not work as expected, please keep it switched off.

6.2 SOUND

Customize the vario sounds by selecting the **[Sound Scheme]**, the **[Distortion]** strength for fast up/down, and the **[Vario Tone Pitch]**.

Use the **[Test Sound]** checkbox to activate the sound loop. Each checkbox activation inverts the direction.

6.3 TONE MODULATION

With **Modulation** you can customize the strength/sensitivity of the vario tone modulation. For flying in weak thermals it is generally better to use the sensitive settings.

Using the **Zoom** functions you can control the level of non-linearity of the vario sensitivity. With more zoom, the vario tone modulation is more sensitive at small vertical speed values.

Note that it does not make sense to use strong zoom with a bad vario/pressure sensor, because you will get misleading random tones.

I prefer to fly always using the same settings, on which my brain is well trained.

6.4 TEC VARIO

Here you can change the TEC (total energy compensation) strength if an airspeed sensor is connected. I recommend to use 80%.

6.5 NETTO VARIO

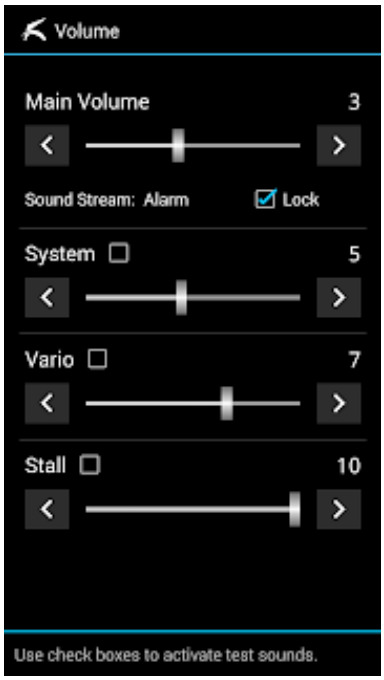
If airspeed is enabled, here you can activate the 'relative netto' variometer function. This has following effects:

- The netto vario indicator is shown on top of the variometer display.
- A new thermal may be found and stored based on the netto lift even if not (yet) circling.

To use this, configure the correct polar curve for the glider.

Please note that so far there is no acoustic signal for netto lift.

7 Volume Control



7.1 [Master Volume]

Use the slider to adjust the main volume for the selected stream.

7.2 [Sound Stream]

Select either the alarm channel (recommended, goes to the speaker) or the media channel (used for music, media, etc and goes to the headset as soon as plugged in).

7.3 [Lock]

The sound lock option will forcefully set the volume, so that it cannot be changed from outside (even if you use the HW button in another app, this will only temporarily change the volume).

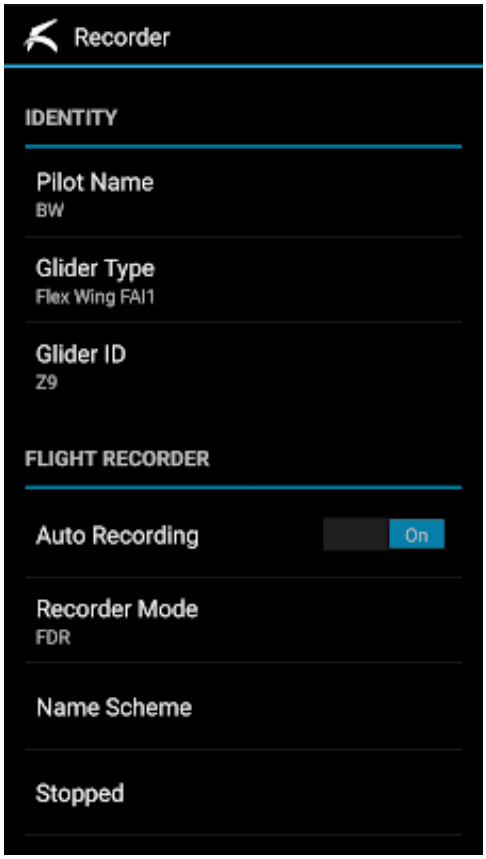
7.4 [System / Vario / Stall]

Using the remaining **sliders** you can tune the volumes for system (on-off) sounds, for the acoustic vario, and for the speed alarm (with speed sensor). Activate the **checkboxes** to hear test tones.

Note: These settings look different in replay mode. There, you can adjust the master volume and, for convenience, reduce the volume while the recorder is playing.

8 Recorder Menu

This menu contains the settings for the flight recorder, for live tracking and for IGC file upload.



8.1 IDENTIFICATION

8.1.1 [Pilot Name]

The name stored in log files / meta data.

8.1.2 [Glider Type]

Defines the FAI glider type for IGC files and for some live tracking services.

8.1.3 [Glider ID]

Defines the glider ID for IGC files and for some live tracking services.

8.2 FLIGHT RECORDER

TotalVario has a built-in flight data recorder. The recorder can produce detailed flight data files in the proprietary FDR format, which you can replay.

You can also generate IGC files. IGC files are signed with a "G-record" and are valid for online contest. You can use the IGC Upload feature to upload IGC files conveniently to a supported server.

FDR files can be converted to IGC and GPX at any time.

8.2.1 [Auto Recording]

If enabled, flights will be automatically recorded.

8.2.2 [Recorder Mode]

Select the mode you want to use:

- FDR is the TotalVario flight data recorder.
- IGC produces *.igc files signed with a G record, valid for online contest.

FDR files are logged with 5 samples per second and can be replayed.

8.2.3 [Name Scheme]

Controls how the names of the recorded files are constructed. Use **#UTC** (UTC time) or **#LOC** (localtime) as placeholders to specify the position of the date/time within the name.

8.2.4 [Status]

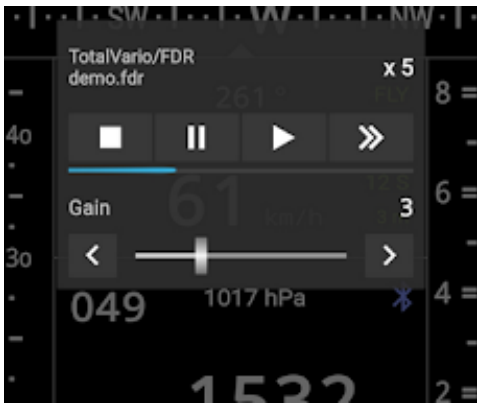
Indicates the status of the recorder.

8.2.5 [Replay]

Opens the FDR selection dialog. Select any FDR file you want to be replayed. FDR files are organized in folders for each year.

After selecting a file, a dialog shows the available meta information of the flight. If you confirm to start replay, TotalVario switches to the main page and starts replaying the flight.

While replaying, you can click inside the top (GPS) data section to open the replay control dialog.



The dialog provides buttons for replay speed and a volume gain control slider (to reduce the playback volume).

Each click on the Fast Forward button changes the speed (2x, 5x, 10x, 20x, 50x, 100x). A click on the Play button returns to normal speed. If the limits of your hardware are reached, especially at 100x, the speed can be less than selected.

You can click on the screen outside the replay dialog to hide it, without stopping the replay.

TIP: Note that also in replay mode you can modify/adjust many TotalVario settings and thus try some 'what-if' scenarios.

8.2.6 [Stop]

Aborts recording or replay manually.

8.2.7 Generating IGC or GPX from FDR files

IGC or GPX files can be generated from FDR files as follows:

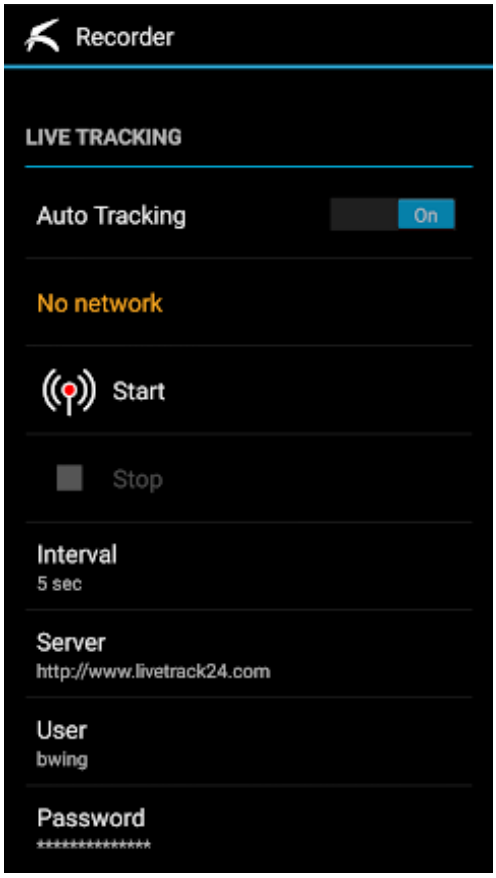
- Open the **SETTINGS** menu and select **[Flight Data] - Manage...**
- Open the relevant subfolder and click on an FDR file for further options
- Select the option **'Convert to ...'**
- Generated files are always created in the IGC / GPX subfolder for the year when the flight was made
- Existing files will not be overwritten

8.3 LIVE TRACKING

TotalVario supports live tracking using the 'Leonardo Live' V1 protocol, which works with Livetrack24 and SkyLines. Furthermore the FFVL and Puretrack APIs are supported.

Other APIs / servers can possibly be added on request.

To use the live tracking feature, first you need to select the server / URL and enter the related credentials. These are different depending on the server.



After that, if a network is available, TotalVario checks the connection/account validity. The check does not transmit position information. Furthermore the connection/account validity is checked automatically each time when this page is refreshed, and after a network becomes available.

If the network is slow or unavailable, information is queued internally. This works even if multiple successive live tracking sessions occur. As long as you do not force-terminate the app, normally no position data is lost.

If tracking is active, TotalVario shows a notification in the system status bar. You can click on the notification to see the transmission status, or to abort the transmission.

8.3.1 [Auto Tracking]

Enables/disables automatic tracking of flights.

8.3.2 [Status]

Indicates the current status of the network/server/session. If you click this field, a connection/account validity check is triggered.

8.3.3 [Start]

Starts a live tracking session manually.

8.3.4 [Stop]

Stops live tracking manually.

8.3.5 [Interval]

Select the tracking interval you prefer. If the interval is too short and the server has high load, or if there are transmission problems, the tracked positions are stored internally and sent later if possible. It is recommended to use an interval of 5 sec or more. For most scenarios shorter intervals do not make much sense.

If the live tracking server is not reachable, you can terminate TotalVario without losing the buffered tracking data. However if you **forcefully** finish the service, for example by switching the smartphone off, data will be lost.

8.3.6 [Server]

Select the server you want to use, or disable the live tracking feature.

8.3.7 Credentials

Depending on the server API, there are one or two fields for entering the login data.

Skylines: Enter the unique tracking key assigned to your Skylines account.

Livetrack24: Enter the username and password of the account.

FFVL: Enter your personal key that you received from FFVL. As the key is long, it is best and easiest to copy it from a web document or an e-mail.

Puretrack: You do not need to enter any login data. Instead a unique device ID is used when sending position data to Puretrack. Optionally you can use the device ID to link your Puretrack account to this device. Simply click on the Device ID field and then use the copy button.
You can also enter a label (basically any text) that will be displayed on the map if the device ID is not assigned in a Puretrack profile.

Warning: Passwords are stored using weak encryption. For security, never use a tracking password/key for any other purpose/account.

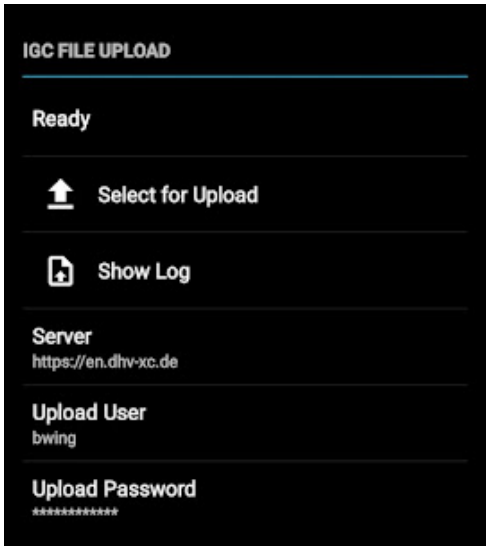
8.3.8 [Insecure HTTPS]

Deactivates the verification of the identity for the selected live tracking HTTPS server. This can be useful if the server certificate has expired, or if your Android device is very old and a Root CA certifacte is missing.

Warning: Only use this option in trusted networks! User ID, Password and Data will be sent even if the network routes it to a different (third party) destination! The connection is no longer secure, similar to simple HTTP.

8.4 IGC FILE UPLOAD

TotalVario supports direct upload to the German DHV-XC server and to many Leonardo servers (e.g. Paragliding Forum).



To use the upload feature, first you need to select the server and configure the user and the upload password. After that, if a network is available, TotalVario checks the user-account validity. If the login succeeded, the status 'Ready' is displayed.

You can select one or multiple IGC files for upload. You can also terminate TotalVario and the upload will continue in background if (or as soon as) a connection to the server is possible.

Each upload request is logged with the corresponding date/time and result.

8.4.1 [Status]

If you click on the status field, a login request is sent to the server to verify if the connection is up and login is possible, and the status should be 'Ready'. Status information related to the current upload is shown here, too.

8.4.2 [Select For Upload]

Use this button to select IGC files you want to upload to the selected server.

Navigate to the relevant IGC folder (typically the one of the current year).

Click on any IGC file to be uploaded. In the confirmation dialog you can select if the file should be published immediately.

To select multiple files you can long click on one of them to enter the selection mode. Then add/remove files as needed. To upload the selected files, use the Upload button which is shown when the selection mode is active. This opens a confirmation dialog.

If file uploads are active or waiting, TotalVario shows a notification in the system status bar. You can click on the notification to see the transmission status, or to abort the transmission.

There is also a button to open the upload history.

8.4.3 [Show Log]

This opens the upload history, where all uploads (failed and successful) are logged. Each year a new upload log file is created. The log files are located in the app folder TotalVario/log.

8.4.4 [Server]

Select the server that you want to use or disable the upload feature.

8.4.5 [User]

Enter the user name of the DHV-XC or Leonardo account.

8.4.6 [Password]

Warning: Passwords are stored using weak encryption. For security, never use an upload password for any other purpose/account.

Note: For DHV-XC, this is NOT your login password. Enter the **upload** password which you can find in your DHV-XC profile.

8.4.7 [Insecure HTTPS]

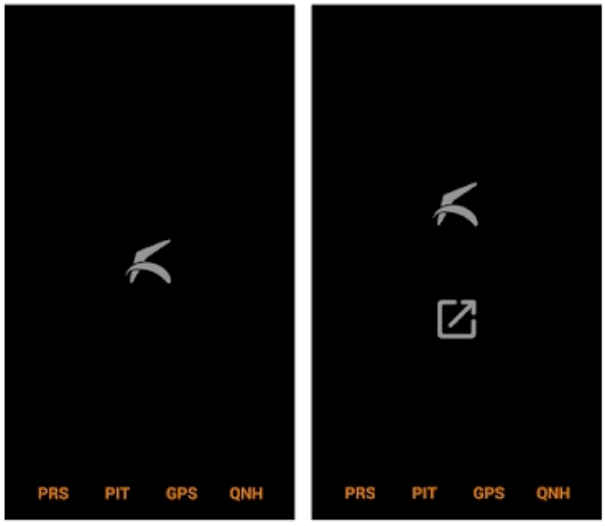
Deactivates the verification of the identity for the selected upload HTTPS server. This can be useful if the server certificate has expired, or if your Android device is very old and a Root CA certifacte is missing.

Warning: Only use this option in trusted networks! User ID, Password and Data will be sent even if the network routes it to a different (third party) destination! The connection is no longer secure, similar to simple HTTP.

9 Screen Lock

TotalVario has a convenient built-in screen saver / screen lock function.

When locked, power consumption is reduced significantly, because the CPU and GPU do not need to continuously construct and draw the instrument panel, and for LED/AMOLED devices due to the dark color.



Screen Saver / Lock Screen (warnings on)

In order to warn you before takeoff in case anything is wrong, the screen saver has 4 orange colored indicators at the bottom:

- **PRS** (pressure/baro sensor problem)
- **PIT** (Pitot sensor problem)
- **GPS** (no GPS fix or GPS fix too bad)
- **QNH** (QNH not set)

9.1 Locking

You can lock TotalVario manually via the quick menu feature by (multi-)clicking the GPS section. **Note that in replay mode this will open the replay control popup instead**.

TotalVario can lock itself after a timeout either while flying, or on ground, or both. This is configurable in the **SETTINGS** menu.

Furthermore TotalVario can lock itself when a landing is detected.

9.2 Unlocking

At any time you can unlock TotalVario by (multi-)clicking the TotalVario icon. If an alternate app is configured, you can also click the alternate app icon to launch the alternate app directly.

In flight, if supported by the hardware, the cover sensor also unlocks the screen saver.

Furthermore TotalVario can unlock itself when a takeoff is detected. It is recommended to activate this function in the **SETTINGS** menu.

10 Legal Notes

10.1 Disclaimer

You use the TotalVario app entirely at your own risk and responsibility.

No liability is accepted for text or data costs that this app can generate in normal or faulty operation.

No warranties are made as to its reliability, correctness, accuracy.

No liability is assumed for consequential damages, injury or loss of life resulting from the use of this application.

Read the Safety Notes chapter!

10.2 Copyright

11 Privacy Policy

The TotalVario app sends location data to external servers if the live tracking feature is configured by the user, using her account on the configured server (LiveTrack24, SkyLines, etc). Flight log files can be transmitted to specific servers on request of the user.

Other installed Android apps (such as email or social media apps) can be used to share data, under full control of the user, of course.

There is no business relation between TotalVario and any of the configurable live tracking or file upload services.

There is also no business relation between TotalVario and BlueflyVario, XCTracer, Compass Italy or any other commercial company providing similar devices.

There are no background services or functions, except those needed for proper operation of the app.

Note: The outdated TotalVario Beta version in the Playstore includes an option to display advertisements provided by the Google AdMob API and it communicates via this API to manage the advertisements.
Google AdMob enables app providers to configure the frequency at which ads are presented even after installation of the app. In any case only non-personalised advertisements may be presented in the European Economic Area (EEA) and the United Kingdom.
However advertisements are completely disabled.