Hard- & Software Entwicklung

Wolfgang Schreiner Dipl.Ing.(FH)
Rüttlenäckerstr.6
88094 Oberteuringen
homepage: www.wstech.de

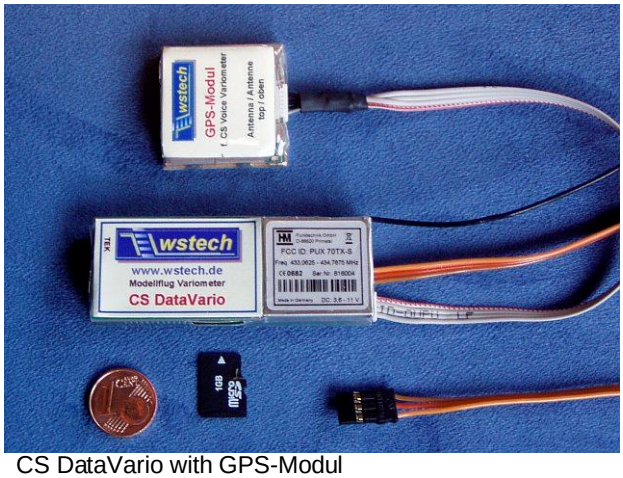
Valid for version 407x and higher 20.3.10

Manual for the Model Airplane Variometer

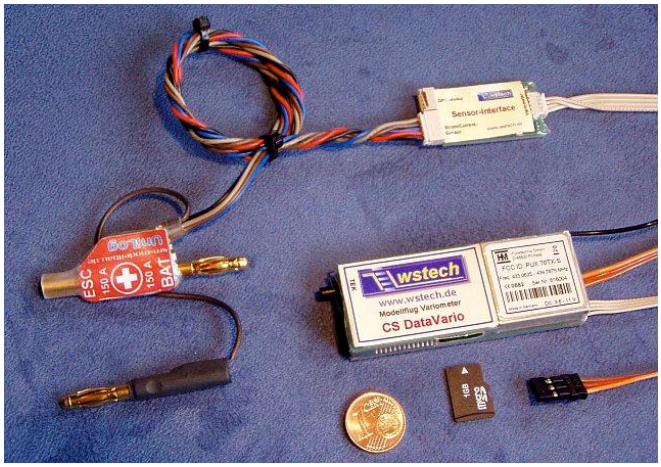
CS DataVario

including Micro-SD-Card-Logger, GPS-, Electric Flight- and Data Logger Options

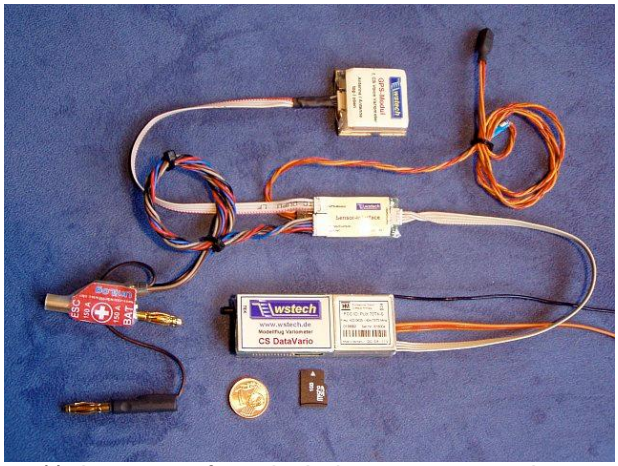
CS DataVario and mirco SD card for the datalogger

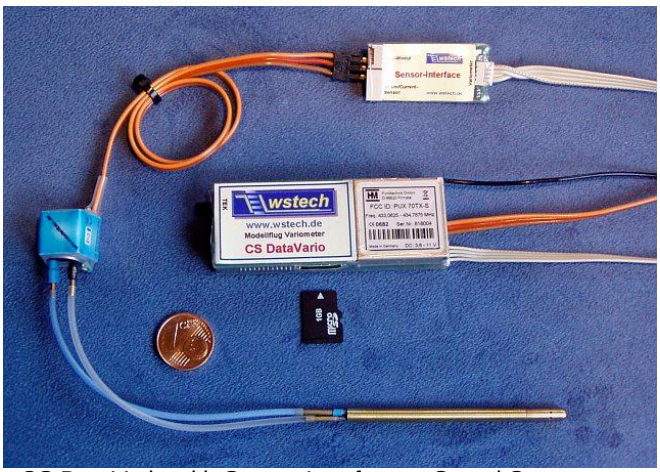


CS DataVario with GPS-Modul

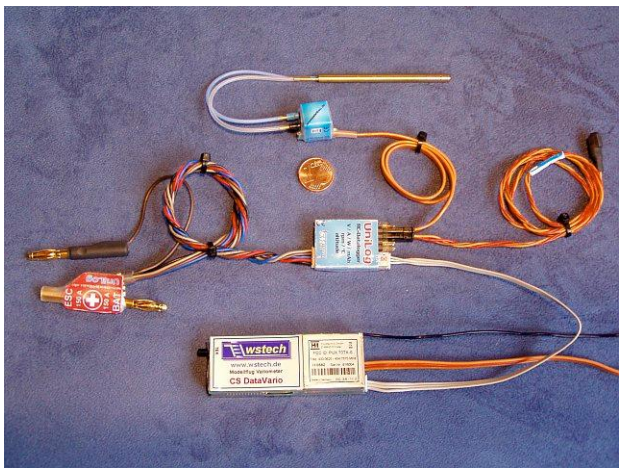


CS DataVario with Sensor Interface a. Current sensor


With Sensor Interface, GPS, Current- a. Temp. Sensor



CS DataVario with Sensor Interface a. Speed Sensor


here with UniLog a. Current, Speed- a. Temp. Sensor

Content

Important notes:

Please read this manual thoroughly and follow the safety advice at the end of this manual.

Upon delivery, the default setting of the vario transmitter is channel "1".

1 Vario Benefits

Vario benefits are numerous. The primary function of a vario i.e. the indication of sink or climb, enhances precision thermal flying and helps the model pilot maximize flight time. It helps to find even weak thermals and to use them to find the optimal flight pattern. This applies particularly when flying at high altitudes and in flat country where it is difficult to evaluate thermals by sight only.

Further, the altimeter provides useful safety information including the continous checking of the onboard power supply. Bad surprises because of drained batteries should be a thing of the past.

Additional modules including the current sensor and GPS allow features like speed and glide ratio measurements and the optimization of electric power drives.

A vario puts a whole new dimension into R/C sailplane flying.

1.1 General Technical Features

- The CS DataVario is an acoustic vario with altimeter and voice output. A sensor interface allows the implementation of external sensors like a current sensor (for electric flight), a temperature sensor or a GPS sensor.
- The CS DataVario contains an integrated data logger. All measurements (time, receiver voltage, altitude, motor current and -voltage, consumed drive battery capacity, speed, temperature, GPS longitude and latitude) are stored on a Micro-SD memory card. Thus the vario contains a "black box" which allows the storage of all flights of a flying season, i.e. 1,000 flights at 3 hours each, and their later evaluation. The evaluation can be done with the "LogView" software (www.logview.info). Additional software transforms the GPS data in CSV-format into a KML format so it can be used with Google Earth or into a GPX-format for Garmin, both of which allow a 3D presentation of individual flights. Thus, data export into many other evaluation software programs is possible.
- The CS DataVario provides important information about the drive system to the electric flyer and allows component tuning and optimization. For this feature, the WSTECH interface or the UniLog Data Logger (SM-Modellbau www.sm-Modellbau.de) has to be connected to the vario.
- A special electric flight mode offers another application which is the continous drive check in an electric model. It comprises the continous announcement of the consumed drive battery capacity and the minimum drive battery voltage.
- The sensor interface from WSTECH allows the direct connection of the WSTECH GPS module, the current and temperature sensor, or the pitot tube speed sensor from SM-Modellbau without the UniLog.
- The GPS module may also be directly connected to the vario (if other sensor modules are not used)
- The GPS module allows the voice output of ground speed, glide ratio and position (perfect for airplane recovery).
- The vario connects to the R/C receiver via a free channel output and receives its power supply from there. If there is no free output available, a Y-cable connection with another channel is possible, for instance with the aerotow hook servo.
- The receiver pulse output allows the remote selection of different vario operation modes.
- A setup routine can be initiated during the switch-on phase of the vario which allows the setup of the vario transmitter channel and different vario parameters and features in order to adapt the vario to your personal preferences. Yet this is not required in the beginning as the vario is delivered with a well proven default setting.
- During the design phase, a high emphasis was put on simple operation and programming. A custom configuration may be setup with the R/C equipment or a servo tester. A personal computer is not required.
- Special emphasis was put on the electronic design to insure that it's immune to high frequency interference. Appropriate design, layout and shielding measures provide this feature thoroughly.

After listing so many options, it is worth mentioning that the basic vario operation mode still follows the "plug and play" pattern.

2 Vario Acoustics and Voice Output

A radio data link transfers the vario information to the pilot on the ground. The transmitter is part of the vario unit whereas a usual and licence free walky-talky (LPD, 433 MHz-band) or a scanner serves as a receiver.

The vario transmits two different kinds of information to the pilot including:

- **Vario acoustic*:*** climb/sink information by the way of a modulated tone signal.
- **Voice output:** Information including altitude, climb rate, current etc., are announced in English along a certain time frame.

Via setup, the pilot may configure the acoustics as well as the voice output and adapt it to his own personal preferences. The different options will be described in the following chapters. Both the vario acoustic and voice output are being transmitted on the same channel. During voice output, the vario tone is briefly interrupted.

3 Vario Installation

The vario is directly powered by the receiver battery. The simpliest way is to connect the vario directly to a vacant receiver output channel.

If there is no channel available, the vario may be connected by a Y-cable parallel to any other servo. In this case, the pulse lead (yellow, white or orange lead) of the Y leading to the vario must be cut. In this configuration, the operating mode of the vario cannot be controlled during the flight and the vario operates only in the “altimeter mode” (see below).

Another approach to sharing a receiver channel with the vario is to choose an infrequently used channel like the aerotow release. This will limit the free selection of operating modes only during the actual aerotow phase.

The best solution is the direct connection to a free channel with direct control by the transmitter. The required setups are described below.

In fibreglass fuselages without carbon fiber, the antenna may be attached to the inside of the fuselage. If possible, the antenna should be extended straight or with only one bend of not more than 90°.

In fuselages with carbon fiber, the antenna should be installed on the outside of the fuselage by leading it out on the shortest way possible (not more than ½” remaining in the fuselage) through a small hole. It should be fixed at some 45° backwards and away from the fuselage. The end of the antenna must not be close to carbon fiber fuselage as this would lead to a very erratic transmission range.

The antenna should not be parallel to other cables or metallic material as this may alter the radiation pattern and the range. By the way, this applies as well to the R/C receiver antenna. The vario antenna should not be parallel to the receiver antenna at close distances as are one or two inches.

Also parallel installation to servo cables should be avoided as this might couple vario transmitter energy into the R/C receiver. This may cause problems as there are receivers on the market which are sensitive in this respect.

If all of the above installation points are noted, there will be a problem free transmission down to the pilot. In any case your installation must be followed up by a thorough range check (see the respective chapter below)

When using digital servos with certain double battery power supplies, thin cables or non-high current receiver batteries may introduce servo noise in the vario tone. Besides avoiding such components, “low ESR” capacitors with a value of 1,000 µF or above will remedy this situation. Such a capacitor might be helpful at the same time to smooth the operation of the receiver itself.

Important note:

All Varios on the market use very sensitive semiconductor circuits as a pressure sensor. Therefore it is mandatory to keep the pressure port (which is also the connector for the TEK nozzle) free from dirt, water and dust and it must not be sealed.

Also, these sensors are **sensitive to light!** Light which enters the sensor through the port opening causes alterations of the measured values. A flashlight may demonstrate this effect as it will cause a climb or sink tone when applied. For practical purposes, the sensor should not be exposed to daylight. A non-permeable piece of tubing will take care of this effect in worst case.

4 Variometer and Altimeter Function

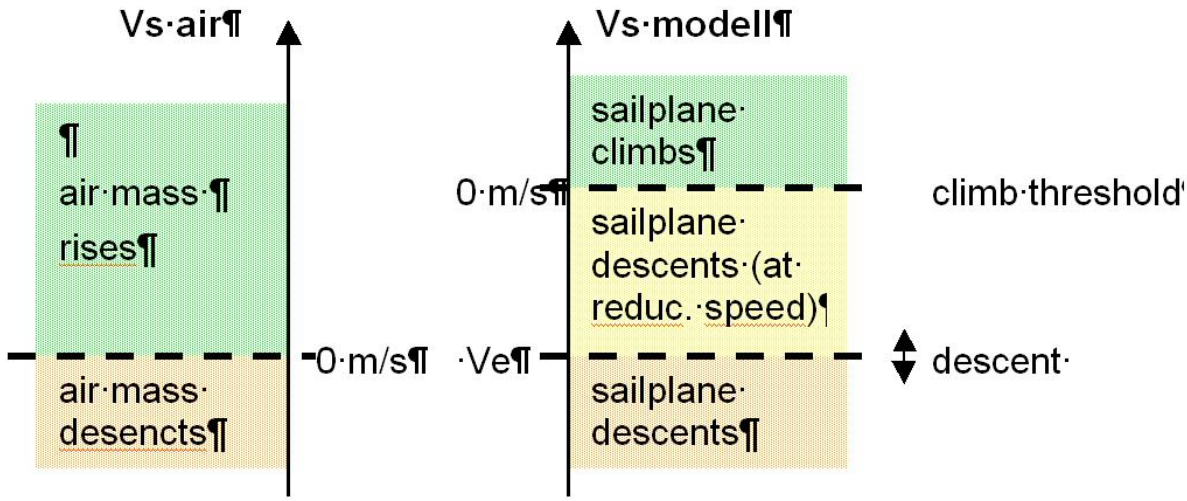
A temperature compensated and calibrated pressure sensor is being used for altitude measurements. The vario signal is derived electronically by determining the altitude change within a defined time period. This variometer signal is then transformed into a tone signal – the vario acoustics. Altitude changes of a few centimeters /second can be recognised by a tone change without considerable delay. The CS DataVario uses a well proven and often acclaimed analogue tone oscillator which has fully linear operation

characteristics without often uncomfortable frequency steps. Model sailkplane pilots who are familiar with varios in full scale planes confirm this. (By the way: CS stands for “classic sound”!)

Descent produces a continous tone which goes lower as the descent velocity is increasing. Climb (> 0 ft/sec is default setting) produces an interrupted, rising tone. The pitch of the tone rises with increasing climb velocity. As well, the interrupt cycle increases at the same time which might be expressed as “ beeeep, beeep, beep, bep, bep...” (default setting)

The adjustment of the descent tone threshold can be setup individually. Before detailing this, some definitions should be handy along the following simple graphics:

Two scales are compared, which for one show the vertical movement of the air mass and for the other show the vertical velocity of the sailplane. Both scales are offset by the value Ve which is the intrinsic descent rate of the sailplane model. On the average, Ve lies in the range of -1.5 ft/sec to -3 ft/sec. On the part of the model, three areas and two thresholds are to be considered. The **climb threshold** indicates true altitude gain of the sailplane. The **descent threshold** indicates sinking airmass. In between the sailplane is still descending, yet the surrounding airmass is already climbing! This is called the “zero-lift area”.



Using the setup procedure the descent threshold can be adjusted between 0 ft/sec and – 6 ft/sec in steps of 0.3 ft/sec.

4.1 Voice output for vario and altimeter

In the vario- and altimeter function, the voice output can deliver either output:

- Altitude
- Integral vario/ sink rate

Switching between the outputs can be done from the transmitter during the flight by using an assigned 3-position switch. Details are described in **chapter 6.**

4.2 Optional Vario Acoustics Modes

As described above, airplane descent (descent rate > descent threshold) is signalled by a continous tone, which goes lower as the descent increases. Airplane climb is signalled by a pulsed tone where the tone pitch and the pulse rate increase with the climb rate.

The “zero lift area” is also signalled with a pulsed tone, yet this one differs from the proper climb tone in that it sounds a **50:50** duty cycle instead of a **25:75** duty cycle of the true lift. (duty cycle = sound on / sound off). Thus, true lift, zero lift and true descent can easily be distinguished.

Setup7 and **Setup8** allow the adjustment of the descent threshold and the acoustics configuration. Optionally it is possible to switch off the descent tone and the zero lift tone.

It is also possible to select a mode which neglects the separate signalling of the zero lift zone. This in turn corresponds to the acoustics of the earlier ClassicSound varios.

The different mode setting options are described in **chapter 16** of this manual.

The various modes allow the adaption of the vario acoustics to the pilot`s preferences. Yet, the default settings on delivery will insure a successful start-up for the vario novice.

4.2.1 Altimeter Mode

Altitudes are announced in steps of 50 m/100 ft in relation to the take-off altitude. The latter is automatically calibrated to 0 after switch-on. If a 50-m- step is not trespassed there is an automatic altitude announcement every 60 seconds (default setting). A step must be over- or underflown at least by 20 m/30 ft before it is announced again. This avoids unnecessary outputs if the sailplane remains above or under a 50 m/100 ft step for a longer period of time. The 60 second default setting can be changed in **Setup 1**. Negative altitudes, i.e. below the take-off point at a slope, generate a shorter voice output interval (default setting 20 sec) which can be changed in **Setup 2.**

4.2.2 Integral (Vario) Mode

The integral vario mode is an ideal complement for the vario voice output feature. It informs about the climb- and descent ratio almost without delay by announcing the average value within a preselected time interval (default: 20 sec, **Setup 3**).

Within this selected time interval the altitude difference to the previous announcement is determined and announced in meters/feet, for exemple “minus 18” or “plus 12” with the meaning of 18 meters descent and 12 meters ascent.

The voice output can be selected either in absolute altitude difference or in relative altitude difference per second. The announcement of, for exemple, “minus 0.6” stands for an altitude loss of 12 meters within 20 seconds.

The voice output mode is selected in **Setup 13.** (The default setting is “altitude difference”)

In the Integral Mode, the voice output of units (“meters”, “seconds”, etc.) has been omitted deliberately in order to interrupt the vario tone only for a time as short as possible.

This feature is particularly advantageous when trying to optimize the search pattern in a thermal. Further it allows the measurement of the sink rate, also at different flap settings, provided there is calm weather and patience on the pilot`s side.

The Integral Mode allows a fast determination of the minimum sink rate and subsequently the fast discovery of sink areas and beginning thermals. The fixed time basis (fixed time basis??) avoids mental arithmetic and makes the integral vario mode a most prefered operating mode, particularly in weak conditions.

4.3 Total Energy Compensation (TEK)

The CS DataVario provides a port for the connection of a TEK probe, a feature which is borrowed from full scale aviation. In general, the probe is being attached to the fin. There are also probe versions which allow the installation on the rear fuselage (close behind the wings) on V-tail sailplanes. This probe compensates for so-called “stick thermals” and it leads to the true indication of thermals. For more information on this subject, please refer to the related chapter on our webpage www.wstech.de.

The use of this TEK-probe is highly recommended for the demanding model pilot as it is otherwise difficult to separate thermal alitude gain from (conscious or unconscious) stick movements.

4.4 Altitude Accuracy

Weather changes or normal pressure changes during daytime easily amount to differences of 1 to 3 hPa (mb) within one hour which in turn yield altitude errors of 10 to 20 m (30 to 60 ft).

During the flight, openings in the fuselage may cause minimal pressure changes on the inside which also can amount to errors of +/- 10 m or 30 ft.

Relative errors due to small forward speed changes, as they are important in the integral vario mode, are substantially smaller and negligeable. They are in the range of the altimeter resolution.

The above errors can be checked by a manually generated read-out of the altitude during a low pass of about 1 to 2 m (3 to 6 ft.) and another read-out after the landing. Differences in altitude are then due to pressure influences from fuselage openings and, when using the TEK probe, the inherent and speed related negative pressure at the probe.

The TEK probe induces a systematic altimeter error towards higher readings. The reason behind is the the measurement of the energetic overall altitude of the airplane, which is the sum of the true altitude and the altitude corresponding to the airplane`s forward momentum. Under normal flight conditions at about 15 m/sec or 45 ft/sec speed, this share is only approx. 10 m (30 ft).

5 Setting Vario Modes with the Transmitter

The above modes can be selected with the transmitter using a 3-position switch or a slider. This mode selection is also necessary for the further features with the GPS and the Sensor Interface described below.

If there is no free servo channel available, the vario can be connected in parallel with any other servo. However, the pulse lead (yellow or white or orange colour) of the Y-cable leading to the vario has to be disconnected and a remote mode selection is not possible. The vario will remain in the altimeter mode.

5.1 Transmitter settings

Select the proper switch or slider and make sure that the servo travel is set to +/- 100% and the middle position at 0%. Normally this is the basic setting.

Next make sure that the TX switch is controlling the output to which the vario is connected.

The next step is to adjust the "servo" travel to control the vario.

All radios, except Multiplex radios using the native Multiplex pulse length

1. Switch/slider in forward position: Set travel to **– 100%** (1.0 msec)
2. ditto in middle position: Set travel to **0%** (1.5 msec)
3. ditto in backward position: Set travel to **+ 70%** (1.85 msec)
4. If available, set "fail safe position" to +150% (> 2.1 msec)

Multiplex transmitter with native MPX pulse (NOT in "Uni"-pulse mode)

1. Forward position: **- 100%** (1 msec)
2. Middle position: **-20%** (1.5 msec)
3. Back position: **+ 50%** (1.85 msec)
4. If available, failsafe position at + 100%, better + 110% (> 2.1 msec)

5.2 Mode Settings and Voice Output Functions

Mode	**Switch-/Slider**	**Mode Feedback**	**Voice Output**	**Vario Acoustics**	**Remarks**
Integral Mode	Foreward	beep	Altitude change since last annoubcement	On	
Glide ratio Mode	Backword, then immediatly foreward	beep „glide ratio"	After 100s continous GPS reception announcement of glide ratio	On	Active above 10m and with GPS module
Altimeter Mode	Middle	beep, beep	Altitude every 50 m and/or after selected time interval	On	Switching from integral mode, immediate altitude announcement
Stand by Mode	Backward	beep, beep, beep	When activated, single announcement of all actual values, afterwards silence. Voltage control remains active!	Off	Vario transmitter is off; low current consumption
Vario only, without integral mode	Backward, then immediately forward	beep, beeeeeeep	None, only vario tone	On	Active only without GPS module
Speed Mode	Forward, then immediately backwards	Beeb, beep, beeeeeeep	Speed announcement after passing speed maximum or continous announcement in 3 sec intervals (see Setup 4)	Off	Active only with GPS module

Important note:

It is always advisable to temporarily connect a servo to the receiver output dedicated for the vario in order to check the mode settings of the transmitter switch/slider. Even more advantageous is a test unit capable of direct pulse length readings (for instance UniTest by SM-Modellbau).

5.3 Mode Setting Feedback

For an easier mode setting follow-up, a feedback tone is being generated when the switch is activated, e.g. a double “beep, beep” for the altitude mode. The different feedbacks are outlined above.

5.4 Standby Mode

Selecting the standby mode puts the vario into a quiet mode, which begins after a **single** announcement of the **actual altitude** and R/C system **voltage**.

The **actual speed** is announced as well if a GPS module is connected.

Additional (single) announcements are being made if the sensor interface either from WSTECH or SM-Modellbau is connected. Details are described in chapter 8.

After these announcements, the vatro tone and the voice output become silent. Only the voltage check and and its announcement remain active in the background. The vario transmitter is being switched off and the vario draws only a very small current.

6 GPS Operating Options

The GPS module from WSTECH allows the announcement of (ground) speed, glide ratio and the model`s position. The GPS module can be connected to the vario either with or without the sensor interface.

Airspeed can be measured with the airspeed sensor from SM-Modellbau plus the sensor interface from WSTECH or SM-Modellbau.

6.1 Speed Mode

The speed announcement can selected either in two different *continous* modes or as a *single* announcement upon selecting the standby mode.

Setup 4 offers a recurring announcement every 3 seconds (Setup 4 on “1”) or a maximum speed announcement after an acceleration phase (Setup 4 on “2”).

Upon activation of the speed mode in either above operating modes, the maximum speed during the previous speed mode activation is being announced.

During the “maximum speed after an acceleration phase” mode, speed announcements are being repeated every 3 seconds, except when the speed is still increasing. I.e. during a dive with its increasing speed, no announcements are being made and only a one-second-beep signals that a measurement is being performed. As soon as there is no more speed increase detected after three measurement cycles, the previously measured maximum value is being announced (exemple: “two-hundred-sixteen-k-m-h”) and afterwards the announcements return to the actual speed.

If a definite speed increase cannot be detected, there continues an actual speed announcement approx. every 5 seconds.

After these announcements, the vario tone and the voice output become silent. Only the voltage check and and its announcement remain active in the background. The vario transmitter is being switched off and the vario draws only a very small current.

The speed mode is activated by selecting the integral mode first and then switching directly into the standby mode. The last previously measured speed value is then announced before the actual readings are continued.

Please note that there are two versions of GPS modules which have the following characteristics:

GPS module with a **green LED**: The LED blinks as long as no satellite signal is received and there is no voice output. The LED signals reception with solid green and voice output is generated along the selected setting.

GPS module with a **red LED**: The GPS module becomes active as soon as the solid red changes to a blinking red.

If the pitot tube sensor from SM-Modellbau is used (together with the WSTECH or the SM-Modellbau sensor interface), all above functions can be used without a GPS module, however, the readings will be “airspeed” instead of “ground speed”.

6.2 Position Announcement

This feature is only possible with a WSTECH GPS module. An **automatic** position announcement serves as a support in case of a crash or a landing in a remote area. This announcement is generated in all modes as soon as the model remains in a +/- 8 m/24 ft altitude window for a period of 2 minutes and more. This will almost never happen during the flight and the pilot will not be distracted because of unnecessary announcements. The automatic announcement after an emergency allows the retrieval of the model by using

either a detailed map, a GPS navigation system or Google Earth. It is advisable to practice this procedure under “normal” conditions.

Disturbing position announcement before take-off are suppressed until the model has left the take-off altitude by plus or minus 10 m/30 ft. If a position announcement is needed on the ground, a piece of tubing may be connected to the TEK port and with a weak sucking action with the mouth, take-off is being simulated. After a delay of about 2 to 3 minutes, the local position is announced in 2-minute-intervals.

The announcement is performed as a sequence of numbers only, with the latitude first and then the longitude in degrees an minutes with four figures after the point.

Example: “47 degrees 43 point 5678 minutes 009 degrees 22 point 4921 minutes”

In all operating modes, the position data is continously stored in a background memory which means that after a R/C failure or a loss of GPS reception after a crash, the latest position is announced and repeated in 2-minute-intervals.

6.3 Glide Ratio Measurement and Announcement

This feature is available only in conjunction with the WSTECH GPS module.

The glide ratio is a number which indicates the amount of meters flown forward while losing one meter of altitude.

The glide ratio is measured over a time frame of 100 seconds and announced thereafter.

This mode is selected by entering the standby mode first with a direct switching into the integral mode.

After 100 seconds of a successful measurement cycle, the announcement will be for example “glide ratio 23” which means that the sailplane moves 23 meters forward while losing 1 m of altitude.

Any interruption of the GPS contact generates a double tone which signals a restart of the measurement cycle.

This mode gives meaningful information only when used in calm air and when flying very wide patterns. Narrow circling should be avoided in order not to disturb the GPS contact.

6.4 GPS Module Installation

The GPS module can be connected to the vario either directly or via the WSTECH sensor interface. The antenna must have an unobstructed “view” towards the sky and it cannot be used behind carbon fiber material. In case the model has a carbon fiber canopy, you may want to consider replacing a 1”x 1” section with a glass fiber window. Another solution would be to ask the manufacturer for a replacement canopy from glass fiber. Laminates with glass- and aramide fibers and thermoplastics cause no problems.

The GPS module should be positioned in the fuselage as high as possible above the wiring and not at the bottom in order to provide an unobstructed view to the horizon.

6.4.1 Additional Notes for GPS Module Operation

- Also without a GPS contact (i.e. within a house), a correct connection between the GPS Module and the sensor interface will generate a lengthened fifth “beep” during the vario start-up and followed by two short beeps. The second short beep signals that the GPS module has been recognised and it is signalled by the announcement “sensor interface and GPS recognized”.
- Connecting the GPS directly to the vario will also generate a lengthened fifth “beep” during start-up, however without any further beeps. The announcement is “GPS recognized”
- **Caution:** If the GPS module has not been in operation for a long period of time, the buffer battery might have run low and the first start-up of the GPS might not be recognised by the vario. During a second start-up after a brief charging time the vario will recognize the GPS module.
- If the GPS module is started in a new position, there is a possibility that the GPS start-up will take several minutes. In rare cases where only a few satellites are within range the start-up may take up to 30 minutes.
- GPS with green LED: Without GPS contact, the LED will blink and no announcements are made. GPS contact will switch the LED to a solid green and speed announcements will be made.
- GPS with red LED: The GPS moduel is ready when the solid red LED starts blinking.
- On the first reception of valid data, a single announcement “GPS o.k.” will be made.
- The GPS module is measuring the two-dimensional speed in relation to the ground. It is sufficient to fly horizontally for 1 second in order to measure the maximum speed. For an accurate measurement, it is advisable to avoid steep dives with a hard transition into horizontal flight as the sudden “change of sight” might change the satellites used for the measurement and thus cause errors. This also applies to circling at high bank angles and stunt flying.

7 Electric Drive Measurements

Together with the sensors and sensor modules

- sensor interface from WSTECH or UniLog from SM-Modellbau
- current sensor from SM-Modellbau
- temperature sensor from SM-Modellbau (optional)

The CS DataVario offers important information about the electric drive to the pilot. The voice output of the drive measurements is independant from the other operating modes and does not interfere with them. The drive measurements are activated by selecting the appropriate code in **Setup 9**.

Two operating modes are being available

7.1 Electric Sailplane

This mode offers information about

- motor current and consumed drive battery capacity
- minimal drive battery voltage under load and in idle
- climb altitude reached
- if applicable, a temperature value, for example drive battery temperature

The announcement starts automatically when the motor is switched on or off, or when the vario is switched into the standby mode.

When the **motor is being switched on** (current > 3 A), the present altitude is stored for the later calculation of the climb altitude. Approx. 3 sec after switch-on, the

- motor current (in ampere)

is announced.

After **switch-off** (current < 3 A), the following values are announced:

- minimum drive battery voltage under load during the last climb-out
- drive battery capacity consumed since the model`s take-off

If the vario is in the integral vario mode during the climb-out, the

- average climb rate (in ft/sec) of the latest climb-out

is announced, which is an ideal means for optimizing the drive system.

7.1.1 Selecting the Standby Mode

If the standby mode is selected, the standard announcement of present altitude and R/C battery voltage is complemented by the announcements of the (idle!) drive battery voltage and the values selected in Setup 9.

7.1.2 Keeping Previously Stored Data after Subsequent Vario Switch-on

After vario start-up, previously stored data is announced and normally erased immediately afterwards. There is one exception:

After switch-on of the vario, the standby mode (transmitter switch backward) can be selected ahead of the fourth “beep” of the initialization phase. In this case, the standard deletion of the summarized climb altitude and the drive battery capacity consumption is canceled.(In contrast, the altitude mode and the integral mode will cause data deletion automatically).

After a flight where all systems were off, this procedure allows you to continue the measurements starting from the earlier values which is helpful when beginning the new flight with the same drive battery.

7.2 Special Mode for Electric Models

This mode monitors the drive battery in an electric model. It can be activated in **Setup 9.** The then vario tone is switched-off completely.

The battery capacity and the minimum voltage since the first power-up are announced in a fixed time interval. This interval (default setting 60 sec) can be selected from 10 sec to 120 sec in Setup 1.

In addition, using the mode setting switch at the transmitter, the voice output of the above values can be triggered at any time. The motor current can be measured by selecting the standby mode.

The following voice output options are available:

- Selecting the altitude mode (switch in middle position) or the integral mode (forward position): Minimum drive battery voltage and capacity consumption (Ah) in the fixed and preset time interval.

- Altitude mode (switch in middle position): The altitiude is announced in 50 m/ 100 ft steps, but not more often than every 4 sec.
- Selecting the altitude mode, coming from the integral mode (switch forward), and when using the pitot-tube-sensor either together with the UniLog A1 mode or the WSTECH sensor interface with the proper setting in Setup 10, option 3: single voice output of altitude and airspeed (km/h)

7.2.1 Selecting the Standby Mode

When selecting the standby mode (switch backward), an immediate measurement of the present voltage and current is triggered and the following voice output initiated thereafter:

- Actual drive battery voltage in volts
- Actual motor current in amperes
- Actual altitude in meters/feet
- Actual R/C supply voltage in volts
- Flight time elapsed since the start-up of the vario, respectively since the first motor power-up, example: “6.7 minutes”
- Actual temperature in centigrades

These values are stored and announced after the following start-up of the vario:

- Flight time, see above

followed by the **maximum** values of

- Altitude in meters
- Speed measured either by GPS or with the pitot tube sensor
- Consumed battery capacity in Ah
- Motor current in amperes
- Temperature in centigrades

and followed by the **minimum** values of

- R/C battery voltage in volts
- Drive battery voltage

8 Alarms and Alarm Thresholds

8.1 Receiver Battery Voltage Check and Alarm

The actual receiver voltage which also supplies the vario is continuously checked by the vario electronics. After start-up the first value is announced after the initialization phase. Later, an automatic announcement is triggered by each step down of 0.1 volt. When the preset threshold value is passed the announcement is preceded for 3 sec. by an alarm tone “djiu, djiu, djiu,...”. The alarm can be set in Setup 6 in the range from 4.4 to 6.0 volt.

A brief switchover to the standby mode will trigger an actual check at any time.

The receiver voltage is always checked by the vario electronics itself, even if a separate data logger is connected into the system.

8.2 Drive Battery Minimum Voltage Check and Alarm

This feature is part of the electric drive measurements and only possible with

- the sensor interface from WSTECH or SM-Modellbau, and
- the current sensor from SM-Modellbau.

Setup 12 allows the setting of an alarm threshold between 5 and 50 volts. When the threshold is passed an alarm tone will sound and the voltage is announced. This alarm will be repeated as lower voltage values are reached, i.e. in steps of 0.5 volt in the range of up to 20 volts and in steps of 1.0 volt at voltages above 20 volt.

A manual request can be triggered at any time by a brief switchover into the standby mode.

8.3 Temperature Check and Alarm

This feature is only possible together with

- the sensor interface from WSTECH or the UniLog from SM-Modellbau, and

- the temperature sensor from SM-Modellbau.

The temperature control is ideal to monitor the drive battery or the motor temperature.

Setup 11 allows the setting of a temperature threshold in steps of 5°C in the range from 5°C up to 125°C. When the threshold is surpassed, an alarm tone will sound and the temperature is announced. The alarm will be repeated at any further step of 5°C.

A manual request can be triggered at any time by a brief switchover into the standby mode.

8.4 Failsafe Announcement

A failsafe warning is possible provided that the R/C receiver contains such an option (usually in “IPD”- and PCM-receivers). In such a case, the failsafe setting of the receiver channel controlling the vario is set at a servo travel of over 100 %. The CS DataVario will detect this pulse length and generate the voice output “failsafe”. (Refer to chapter 6.1)

9 Flight Time or Motor Run Time (respectively)

A flight timer can be activated in Setup 5, #2. This timer starts with the vario start-up and is automatically reset to zero as soon as the airplane leaves a +/- 10m window around the take-off altitude.

The timer is announced together with the set of other values which are announced when the standby mode is selected. Thus a timer reading is possible at any time.

The timer value is also stored and announced as the first voice output during a following vario start-up.

If the electric model mode is selected (Setup 9, #5), the timer is automatically operating as a motor timer. The measurement is started when a motor current above 3 A is detected and stopped when the current falls below 3 A.

10 Max-/min-value Storage

Independant from the data logger feature, the following max-min-values are stored in a non-volatile memory:

Standard is:

- the maximum altitude and minimum voltage of the receiver battery,

When operating with the GPS module or the pitot-tube-speed sensor in addition:

- the maximum speed

When operating with the sensor interface and the current sensor:

- the values as selected in Setup 9 (current, consumed capacity, climb altitude)

When operating with the sensor interface and the temperature sensor:

- the maximum temperature.

10.1 Stored Data Announcement during Vario Start-up

Immediately after start-up, the values of the preceding flight are announced, for example: “Maximum 223 meters” “186 k m h” “Minimum 4.72 volts”

The values remain in the memory during the start-up phase. After its termination (approx. 5 sec) the values are deleted.

The announcement can be stopped immediately by switching to another operating mode.

The summarized climb altitude and the summarized capacity allow straightforward conclusions about the drive systrem efficiency.

When the electric model mode is selected additional values are announced, see chapter 8.

11 Data Logger

The data logger feature is a novelty in the CS DataVario and allows the automatic data storage for later evaluation on a PC.

The vario contains a so-called black box which can store the data of a whole flying season with some 1,000 flights at 3 hours each on a 1 GB memory card.

The data logger registers at a rate of 1 second (but not during announcements) the following data on a Micro-SD-card in CSV-format.

Example for one set of data:

$1;1;183;5613;329;64;21514;523;43;24;009264907;47429305;0

The figures separated by the semicolon represent the following values:

$1;1; is a starting code, followed by

Time in sec; receiver voltage in millivolt; altitude in meters; motor current in amperes; motor voltage in mV; consumed battery capacity in mAh; speed in km/h; temperature in °C; GPS-logitude and latitude in degrees and minutes with 4 figures behind the decimal point;

0 corresponds to CR LF (carriage return, line forward)

During the flight the data sets are transferred to the Micro-SD-memory card every 10 to 15 seconds.

Each flight is stored in a separate file in CSV-format which receives an individual 5-figure identification generated by the vario. Example: LOG00027.CSV

If there is no memory card in the slot, the vario announces “memory card not detected” during start-up. Note: the vario can be operated without a memory card.

The data evaluation can be done with the LogView-software from www.logview.info

The GPS data stored in the LOG000xx.CSV files can be extracted with the CSV2KML program and transformed into files to be used in Google Earth 2-D and 3-D files or into Garmin GPX-files for the visualization of individual flights. Also, data conversion into other flight analysis software is possible.

All evaluation information and software is available on www.wstech.de/user.htm
Important: For a trouble free operation, only memeory cards offered by WSTECH should be used.

12 General Notes about Vario Operation

The start-up sequence is as follows:

- Immediately after start-up, the preset transmission channel is announced on channel 1. Thus it is possible to find the preset channel in case of doubt.
- Afterwards all announcements are made on the preset channel with the software version number as a sequence of two or three figures, example “Version 4 0 3 “
- The announcement ”memory card detected” confirms the presence of the memory card.
- If a setup file SETUPUPL.HEX is recognized on the memory card, the vario will use it from thereon and confirm it by “setup detected”.
- The values of the previous flight are announced as for example: “ maximum 223 meter” “176 k m h” “ minimum 4 point 7 2 volt” (Speed only with GPS module)
- The initialization phase is accompagnied by 5 short “beeps”.
- Within this time frame it is still possible to reread the above values by switching the vario off and on. Afterwards they will be deleted.
- After a short interval of about 1 sec. the higher pitch feedback tone of the altitude mode is sounded as “beep” “beep”.
- At least one voltage announcement will follow then and depending on the mode selected at the transmitter, an additional announcement of the altitude.
- In the altitude mode an altitude announcement will follow every 60 sec and/or after exceeding a 50 m/ 100 ft step.

Additional notes:

- If several servos are activated after start-up it is possible that a second voltage announcement is triggered. The reason is that the idle voltage of the R/C battery is decreasing by more than 0.1 V due to the servo current load. The next announcement will not be triggered before the voltage has decreased for another 0.1 V.
- If the airplane is entering a fast dive, the frequency of the vario will go towards zero and the vario will be quiet.
- An earphone with the LPD will avoid bothering the fellow modellers nearby.

13 Notes about the CS DataVario Operation together with the WSTECH Sensor Interface

The sensor interface is connected to the vario by a special 4-pole cable which is part of the sensor interface delivery.

A sensor interface with an already connected GPS module will be recognized automatically by the vario.

If a current sensor is connected, Setup 9 and 10 have to be configured accordingly. The type of current sensor itself has to be selected in Setup 14.

Recommended setups

For electric sailplanes:

- Setup 9 at #4 and setup10 at #0
- Setup 14: Select current sensor type: 80 A or 150 A or 400 A
- Optional: Drive battery voltage alarm in Setup 12
- Optional: Temperature threshold in Setup 11

For electric models:

- Setup 9 at #5 and Setup 10 at #0 ; all other Setups may remain in their default setting
- Setup 14: Select current sensor type: 80 A or 150 A or 400 A
- Optional: Drive battery voltage alarm in Setup 12
- Optional: Temperature threshold in Setup 11

The pitot-tube airspeed sensor may replace the WSTECH GPS groundspeed sensor for speed measurements. Setup 4 allows the choice between a single announcement of a maximum speed reading and a continous mode. The details are described in chapter 7.1.

All these modes and alarms can be configured in the setup procedure.

The sensor interface can either accept the temperature or the pitot-tube sensor from SM-Modellbau.

If the temperature sensor is connected there is a setting above 0° required in Setup 11 in order to activate the temperature announcement in the vario.

In reverse, if the speed sensor is connected setup 11 must be set to 0 and Setup 10 at #3. The temperature check and announcement is then suppressed automatically.

13.1 Important Notes about Sensor Interface Operation

- Only the special 4-pole cable is to be used for connection to the vario.
- Both connectors do not have a special assignment; they may be used either way
- The current sensor should not be connected to the motor drive battery before several seconds after vario start-up
- Important: Always connect the negative lead first.
- The sensor interface is powered by the vario
- The default setup settings provided, there is no need for any setup changes if the sensor interface is connected together with the GPS module only.
- With the current sensor connected, Setup 9 must be set accordingly. Otherwise there will be no announcement of electric drive measurements.
- Setup 14 has to be set according to the current sensor. Default setting is the 150 A type from SM-Modellbau.
- If the sensor interface and the GPS module are connected correctly, the 5th “beep” of the start-up phase will last longer than the first four and it is followed by two short “beeps”. The vario thus indicates the detection of the GPS-module and it announces ”sensor interface and GPS detected”
- When operating the sensor interface without GPS module, there is only one short beep (instead of two) and the voice output “sensor interface detected”.

14 Notes about CS DataVario Operation together with the UniLog Data Logger

UniLog, current sensor, temperature sensor and speed sensor are products from SM-Modellbau (www.SM-Modellbau.de) and are available in their online-shop.

The UniLog data logger is connected to the vario with e special 3-lead cable from WSTECH. The 4-pole COM-port is used on the UniLog side.

If the UniLog is connected, the vario has to be configured for this in Setup 10; otherwise there would be no data exchange between both units. Even though the vario will recognize lots of settings by itself, it is mandatory that the user takes care for the following settings when operating the vario with the UniLog:

Electric sailplanes *without* TEK probe:

- Setup 9 at #4 and Setup 10 at #1

Electric sailplanes *with* TEK probe

- Setup 9 at #4 and Setup 10 at #2 , all other setups may remain in the default setting

Electric planes

- Setup 9 at #5 and Setup 10 at #1, all other settings may remain in the default setting
- Optional: Drive battery minimum voltage alarm with Setup 12. “0” stands for deactivated.
- Optional: Temperature alarm thereshold with Setup 11. “0” stands for deactivated.

The UniLog module is powered by the motor battery if operated together with the current sensor.

The pitot tube sensor may replace the GPS module at the UniLog for the measurement of airspeed instead of groundspeed.

The altitude measurement generated in the UniLog may be used for the altitude reading (refer to Setup 9, #2). This will avoid the altitude error which is inherent when operating the vario with the TEK probe.

All these settings may be set with the R/C transmitter.

15 Notes about CS DataVario Operation together with the UniLog Data Logger

15.1 UniLog Data Logger Settings

- Storage rate at 0.5 sec; higher values would delay vario announcements
- Automatic start-up after 15 sec.
- Current sensor to be selected accordingly
- A1 mode: Eventually select the speed sensor used. Without speed sensor select ”millivolt”
- Temperature sensor only to be connected to port A2 of the UniLog

According to the selected A1 mode, the vario recognizes if the speed announcement is on or off.

15.2 Important Notes about UniLog Data Logger Operation

- There must be no 4-lead cable used for the connection between the vario and the UniLog, only the 3-lead cable provided with the delivery.
- There is no special assignment for the plugs. The cable may be used in either direction.
- When starting the vario, the UniLog should still be without power. Otherwise there might occur difficulties with the vario reset.
- The current sensor should be connected to the motor battery only a few seconds after vario start-up.
- Important: For safety reasons, always connect the negative leads of the UniLog and the drive battery first.
- A lengthened 5^{th} beep tone during the vario start-up sequence signals the correct connection to the UniLog.
- If the altitude announcement is selected in Setup 10, #2, the double tone is followed by a short beep.
- If the UniLog is still without power after the vario start-up sequence, this is signalled by a continoius beep. This beep stops as soon as power is applied to the UniLog.
- The UniLog receives its power supply from the motor battery if it is operating with a current sensor. Alternatively there is the option of supplying the power from a direct connection to the R/C receiver.
- CS DataVario Setup 14, current sensor type, is not active with the UniLog. The correct setting of the current sensor type has to be done directly in the UniLog.

16 Parameter Setting

The default parameter settings on delivery are well proven and do not necessarily require instant resetting. An accidental entry into the setup procedure can be finished immediately by switching off the vario.

First, the vario control switch/slider transmitter settings have to be adjusted according to chapter 6.1 for any intentional access to the following setup procedure.

- Switch on the transmitter and set the vario control switch to altitude mode/middle position. After vario switch on and the the following announcement of previous flight values, five beeps are sounded in a one-second sequence.
- Switch the vario control to the integral mode/forward position between the 3rd and the 5th beep and the vario will enter the setup status by announcing the setup parameters in the sequence as described below, example: “setup 0, 0”, pause, “setup 1, 60”, pause, etc.
- In order to change a parameter setting, the control swith is brought back into the middle position during the announcement of the related parameter.
- This starts the announcement of the parameter values from the minimum value up to the maximum value.
- This announcement is repeated until the control switch is brought forward. The current announced value is stored and repeated for re-check in the voice output.
- Leaving the switch in the forward position initiates the next setup position, a.s.o.
- The setup procedure can be stopped at any time by switching the vario off.

Setup 0 sets the vario RF channel whereby the first sequence of the announced numbers stands for the tens digits and the second for the digits. The newly selected channel will be activated with the next vario start-up.

Immediately after the vario start-up, the selected channel is announced on channel 1 which allows to find the selected channel in cases where it is not known or not remembered.

Setup 0: RF channel in the range of channel LPD 1 to 69 ; FRS 1 to 14 (default. Channel 1)

Tens digits are selected first, then digits in a second sequence

Setup 1: Applies if the present altitude is above the take-off altitude. Altitude announcement time interval between 10 sec and 120 sec (default: 60 sec). In the electric flight mode (Setup 10, #5) the time interval determines the announcement sequence for consumed motor battery capacity and its minimum voltage.

Setup 2: Applies if the present altitude is below the take-off altittude, i.e. slope flying. Altitude announcement between 10 sec and 60 sec (default: 20 sec).

Setup 3: Integral vario announcement time interval between 5 sec and 30 sec (default: 20 sec). Setting “0” stops announcement.

Setup 4: Speed announcement (speed mode)

#1 Continous announcement (default)

#2 Announcement of maximum value after an acceleration phase

Setup 5: Vario mode

#1 Standard vario mode without flight time (default)

#2 Standard vario mode with flight time (in minutes)

#3 Altitude announcement after time interval (setup 1 and 2), no 50 m step announced.

Setup 6: Receiver battery alarm between 4.4 V and 6.0 V (default: 4.7 V)

Setup 7: Sink threshold between – 2 m/sec and 0 m/sec in steps of 0.1 m/sec (default: 0 m/sec)

Setup 8: Vario tone mode

#0 Altitude mode only without vario tone (for aero-tow tug pilots)

#1 Sink threshold = climb threshold (no zero lift identification). The climb tone is pulsed with a 50% duty cycle, the sink tone is continous.

This mode corresponds to the previous Classic Sound varios from WSTECH.

#2 No vario tone between sink- and climb threshold (“zero lift fade out”), climb tone pulsed with a 25% duty cycle, continuous sink tone.

#3 Tone between sink- and climb threshold pulsed with a 50% duty cycle (zero lift zone), climb tone pulsed with a 25% duty cycle, continous sink tone.

#4 corresponds to #3, yet without sink tone.

Setup 9: Current announcement, vario operating with sensor interface from WSTECH or UniLog from SM-Modellbau

#0 operation without current sensor (default setting, required to suppress unnecessary announcement)

#1 Electric sailplane mode with current sensor. Only motor battery voltage announcement in standby mode

#2 In addition to #1: Sum of altitude gain

#3 In addition to #1: Consumed battery capacity

#4 In addition to #1: Sum of altitude gain and consumed battery capacity

#5 Special mode for electric flight and electric acrobatics

Setup 10: Operation with UniLog or sensor interface with pitot-tube speed sensor

#0 Operation without UniLog (default)

#1 Operation with UniLog: vario altitude announcement

#2 Operation with UniLog: UniLog altitude announcement

#3 Operation with sensor interface and speed sensor: announcement of airspeed (instead of GPS ground speed)

Setup 11: Alarm threshold for temperature between 5°C and 125°C in steps of 5°C. “0” is default setting if there is no sensor plugged into the sensor interface or the UniLog.

Setup12: Motor battery alarm threshold in steps of 0.5 V from 5 V up to 20 V and in steps of 1 V from 20 V up to 50 V. “0” is default setting without alarm function.

Setup 13: Units anounced in the integral vario mode

#1 Announcement as altitude difference (in meters) within the preset time interval (Setup 1 and 2), example: “minus 12” after 20 sec (default)

#2 Announcement as vertical speed, example corresponding to #1 above: “minus zero point six”

Setup 14: Current sensor type from SM-Modellbau

#1 40/80 A sensor

#2 150 A sensor (default)

#3 400 A sensor

Setup 15: Announced units in meters or feet

#0 Feet

#1 Meters (default)

16.1 Setup Storage on the Memory Card

If a memory card is placed in the vario, each initiation of the setup procedure will in turn initiate the storage of an actual set of parameters in a SETUPUPL.HEX file.

If this file is found on the memory card after a following start-up of the vario, it will be read and update the internal setup.

This allows the storage of customized setups where different models have their specific parameters on their chip cards.

17 Frequency Setting

On delivery the default setting is channel 1

Important: Please refer to the LPD manual in chapter 25

For channel selection use Setup 0, which allows the choice of 69 channels with

channels 25 kHz apart. This remote selection is particularly helpful in hidden vario installations.

Immediately after start-up, the selected channel is announced on channel 1 which allows to find it again in case it is unknown or not remembered.

Channel 1 corresponds to 433.075 MHz and channel 69 to 434.775 MHz.

All ISM band LPD walky-talkies may be used for data reception, not to be mixed up with 448 MHz PMR devices.

18 R/C System Range Check

As a general rule any new installation or installation changes should be followed by a R/C equipment range check. It goes without saying that after all the previous work up to this point, there should be time allocated for these safety measures.

Refer to the notes by the R/C equipment manufacturer!

Collapse the transmitter antenna fully and place it in the hands of a helper (never on the ground). Hold the model high in your hands and walk away at least 150 ft. There must be no sporadic servo action within this range, also when you turn the model around and point it into any direction.

19 Update via USB-Interface

If applicable the CS DataVoice may be updated to the latest software version with an USB Interface Cable (identical to the UniLog Interface Cable from SM-Modellbau, item # 2550).

The latest software release and the update procedure is described on www.wstech.de/user.htm

20 Warranty

There is a 2 year warranty starting with the delivery and referring to the functions of the product described in this manual. The warranty covers production and material failures. All further claims, particularly those referring to personal and material damage and their consequences, are excluded. There is no warranty in cases of inappropriate handling.

The defective goods have to be returned together with the invoice and appropriate postage.

21 Recycling Note

Old equipment which is marked with the above symbol must not be disposed of in the household garbage. Return the equipment to the manufacturer for a appropriate disposal.

22 Safety Notes

The equipment must only be used for the applications described in this manual.

Also note the safety notes and manuals of equipment to which this equipment is connected to.

The manufacturer does not take any responsibility for either damages which occur during the use of this equipment or any claims from third persons.

23 Technical Data

Technical Data of the Vario

Telemetry system for the data transfer from the model airplane to the pilot.

Telemetry transmitter frequency adjustable via R/C transmitter; transmitter completely off in standby mode.

LPD: Channel selection: 69 channels, 25 kHz apart from 433.075 MHz to 434.775 MHz

FRS: Channel selection: 14 channels,

Frequency shift: max. +/- 2.5 kHz

Bandwith: max. 18 kHz

Max.data rate: 6 kHz (limited by a 3 kHz low-pass filter)

Antenna: 17 cm flexible wire

Size: typical 65 mm x 25 mm x 12.5 mm

Weight: typical 27 g

Vario sensitivity: approx. 0.05 m/sec

Altitude range: - 400 m to 3,200 m in relation to sea level

Altitude resolution: typical 3 m

Integral vario at a 20 sec time base (time base adjustable in setup mode: 10 sec to 120 sec)

Receiver voltage announcement

Receiver voltage check and alarm (adjustable between 4.4 V to 6.0 V)

Speed announcement in km/h (only with GPS module)

Position announcement automatically approx. 2 min after landing (only with GPS module)

Announcement: English with female voice

Power supply: 4.5 V to 9 V DC from 4 to 5 NiXX-cells or 2-cell Lipos via 3-pole connector from the R/C receiver

Supply current: typical 35 mA at 5 V, with GPS module: typical 80 mA. Transmitter off in standby mode: current typical 15 mA.

Range: approx. 2,000 m, depending on antenna position and with LPD at shoulder height

Options with Sensor Interface from WSTECH or UniLog from SM-Modellbau

Motor current measurement: up to 400 A, depending on current sensor type
Voltage measurement: up to 60 V
Climb rate measurement
Temperature measurement: - 40 °C to 125°C
Altitude announcement with UniLog data: up to 4,000 m
Speed measurement with pitot-tube sensor: up to 250 km/h or 400 km/h
Special mode for electric flight

Technical Data of the Sensor Interface from WSTECH

GPS module port
Current sensor port for current sensors from SM-Modellbau
Temperature-, respectively speed sensor port for SM-Modellbau sensors
Size: typical 17 mm x 31 mm x 7 mm
Power supply from vario

Technical Data of the GPS module with integrated antenna

Size: typical 31 mm x 31 mm x 11 mm
Weight: approx. 20 g with interface cable
Chipset: GSP3F SiRF StarIII technolgy
Tracking sensitivity: -159 dBm
Channels: 20
Position 10 meters, 2D RMS 5 meters
Acquisition rate (Open sky and stationary requirements):
Reacquisition 0.1 sec., average
Snap start 1 sec., average
Hot start 8 sec., average
Warm start 38 sec., average
Cold start 42 sec., average
Dynamic:
Conditions altitude 18,000 m / 60,000 ft. max.
Velocity 515 m/sec / 1000 knots max.
Acceleration 4 g max.
Jerk 20 meters/sec max.
Power: 4.l5 V to 6.V DC
Supply current. 75 mA max.

24 Declaration of Conformity

Hard- und Software-Entwicklung

EG - Konformitätserklärung

Ich

wstech

Wolfgang Schreiner Dipl.Ing.(FH)

Rüttlenäckerstr. 6

88094 Oberteuringen

Germany

erklären, dass das Produkt

Modellflug-Variometer

CS & CS DataVario

auf das sich diese Erklärung bezieht, mit den nachfolgenden Richtlinien und Normen übereinstimmt.

R&TTE-Richtlinien 99/5/EG

Norm: EN 300 220 - 1 (Ausgabe November 1977)

Diese Erklärung wird abgegeben von Wolfgang Schreiner wstech.

Oberteuringen 5.5.2006

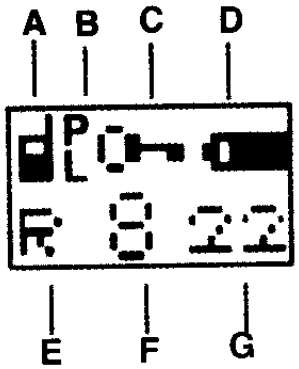
wstech Wolfgang Schreiner

Hinweis:

Das Modellflug Variometer entspricht mit seinem verwendeten Sender den deutschen Bestimmungen und kann hier betrieben werden. Der Betreiber in anderen Ländern muss bei abweichenden Bestimmungen sicherstellen, dass der Einsatz den dort gültigen Bestimmungen entspricht.

25 Instructions for Setting-up the UHF-Handy LPD

UHF-Handy LCD Display



A - Shows the walkie-talkie  symbol when transmit is manual (by pressing the PTT key) or a microphone if transmit is voice operated (VOX mode). *Should show the walkie-talkie symbol when set correctly.*

B - Shows **P** when set to PMR band (448 MHz) or **L** when set to LPD band (433 MHz). *Should show **L** when set correctly.*

C - Shows a key if the keypad is locked.

D - Battery state.

E - Shows **T** when transmitting, or **R** when receiving. *Should show **R** when the vario is switched on.*

F - Channel number. *Should show the channel the vario has been configured to when set correctly.*

G - Squelch Code Number. *Should be blank when set correctly.*

UHF-Handy Buttons

Left Green Arrow button	Select volume adjust
Up & Down Black Arrow buttons	Increase or decrease volume, move to above or below menu option.
Right Red button	Confirm sound level, select menu option.
PTT button	Transmit.
Call button	Sound bell on other LPDs set to same configuration.

Battery Installation

Loosen the belt clip screw, remove the cover, and fit four 1.5V AAA disposable batteries. Four AAA size NiMH or NiCd cells can also be used.

Switching On & Off

To switch the unit on press the right hand red button for 3 seconds. To switch the unit off press the right hand red button again for 3 seconds.

Setting Band and Operation Mode

The UHF-Handy is a general purpose walkie-talkie that can transmit and receive on two bands. In order to work with the WSTech Classic Sound 139-Channel Variometer it has to be setup to use the LPD band, use the same channel as the variometer has been set to, and squelch must be switched off. These settings only need to be made once, and can be done as below:

1. Switch the unit on.
2. Press Up arrow key till **CH** is displayed, and select with the red key on the right.

3. Select **Band** using the arrow keys, and select with the red key on the right .
4. Select **LPD** using the arrow keys, and select with the red key on the right.
5. Now use the arrow keys to choose the channel (1 to 69) and selected with the red key on the right.
6. The selected channel number should now be displayed in the **F** field on the display (shown as channel 8 in the illustration).
7. Select *no code squelch* by pressing the Up arrow key till **Code** is displayed, and select with the red key on the right. Then use the up or down arrow keys to change to code **00**, and select it with the red key on the right. This is indicated by the **G** field on the display being blank.

Once setup correctly the display will look like this:

This shows the UHF-Handy set to receive on LPD channel 8, with the vario not currently transmitting. Once the vario is switched on an **R** will be displayed in field **E** (below the walkie-talkie icon), and the vario's sound will be heard from the loudspeaker. For private operation remove the jack socket's protective cover next to the antenna, and plug in the earpiece's jack plug.

Adjusting the Volume

To adjust the volume press the left green key and use the arrow keys to increase or decrease the loudness. Press the green key again when finished.

Other Options

- For the UHF-Handy to work correctly with the variometer it must **not** be in **Scan** mode, instead the band and channel must be explicitly set, as explained above. In **Scan** mode any small transmission interruption by the vario will cause the UHF-Handy to restart the scan, which will cause a long break in vario reception.
- The **Squelch** sensitivity can be set in the menu option **SQ**. The unit is most sensitive when all four bars are shown (default adjustment).
- The keyboard can be disabled (indicated by displaying a **key** symbol on the display in field **C**) by almost simultaneously pressing the right key and then the upper arrow key. Unlock the keyboard by repeating the key combination.

VOX mode must be deactivated, or loud sounds will switch the walkie-talkie into transmit mode. When **VOX** is active a microphone symbol is shown on the display in field **A**.

Important note

For optimal reception, use the LPD at breast height.